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PSYCHOLOGY

AN INTRODUCTORY MANUAL FOR THE USE OF STUDENTS

BY

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AN INTRODUCTORY MANUAL;" "LOGIC: AN INTRODUCTORY MANUAL,"
ETC., ETC.



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PREFACE.

DURING the seventeen years which have elapsed since the original publication of this little book, a great deal of valuable work has been done by English, American, French and German psychologists. For the first time in the history of the science an adequate basis of accurate, quantitative, well-arranged facts has been obtained in most departments of the subject. The employment of experimental methods of research has been by no means confined to the phenomena of sensation, but has been extended to memory, conception, emotion and will. At the same time there has been a marked tendency among psychologists to fall into line, and come to general agreement with regard to questions of method, classification and definition. The crude mechanical views of the English Associationist School have been abandoned by nearly all recent psychologists; and a clearer division has been made between purely psychological problems and the metaphysical problems which were formerly confused with them.

The author hopes that this new edition of a work which has proved useful to students for many years may prove still more serviceable in the future. It has

been almost entirely re-written, and considerably enlarged. In its original form it was mainly an attempt to explain and supplement the *Mental and Moral Science* of Dr. Bain, then the "only tolerably complete and systematic treatise on Psychology in English, available for beginners." It now professes a wider scope, and endeavours, like the author's *Logic* and *Ethics*, to give a sketch of the subject on the lines usually followed by English and Indian Universities. The works of Ward, James, Sully, Stout, Ribot, Binet, Höffding and Wundt, to mention no others, have been constantly laid under contribution. The list of Books Recommended in the Appendix will, it is believed, be of considerable service to those beginners who wish to carry further their study of the subject.

The author has again to thank Mr. W. E. Tanner, M.A., of the University of London, for corrections and suggestions.

PUTNEY,
May, 1897.

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PSYCHOLOGY.

CHAPTER I.

SCOPE AND METHOD.

§ 1. Subject Matter of Psychology.

PSYCHOLOGY is the science which deals with mental phenomena as mental phenomena. These phenomena it describes and classifies. It analyzes complex phenomena, and shows how they are built up from simpler constituents. It explains the phenomena by exhibiting their relation to each other, and by assigning the condition of their occurrence.

✓ This account leaves us, however, with the word "*mental*" undefined. In a fashion we all understand what is meant by the words *mind* and *mental*. It is, however, hopeless to attempt to define them in such a way as to satisfy the canons of Logic. We may content ourselves with a negative definition by saying that "Mental phenomena are those to which we cannot assign any material existence," which breaks at least one rule, and perhaps two;¹ or we may drive back

¹ See Ryland, "Logic," chap. xi., § 2. The fourth, and perhaps the third rule; since *material* can hardly be defined except by antithesis to *mental*.

the difficulty a step by saying that "Mental phenomena are the phenomena of consciousness," where consciousness means practically the same thing as Mind; or finally we may acknowledge frankly that of Mind, as of Space, Time, Cause, Life, and other ultimate terms, no entirely satisfactory definition can be given.

The usual plan is to adopt the first alternative. Mental phenomena are defined as those natural phenomena which are not material, that is, which do not occupy space, offer resistance, or possess gravity. But while this plan has some convenience, it is open to the objection that in a certain sense all material objects may themselves be looked on as facts of consciousness. Psychologists are agreed that what we call objects of perception can be analyzed, so far as they are objects of perception, into sensations and thoughts.¹ For them, *thing* has no meaning except as an object of experience, that is, a group of phenomena which belong to the class we call "mental."

All facts of external experience may thus be regarded as facts of consciousness. What I call, from one point of view, a material object—say, the pen in my hand—may also be treated as a perception, and resolved into a special group of sensations, and so forth. Nor can we discover anything in it beyond this group of purely mental facts; though it is arguable that we may have to assume something else, over and above the mental

¹ See chap. vi., § 5 below.

facts.¹ Dr. Ward, therefore, urges that the peculiarity of Psychology does not lie in its having a special subject-matter, since all objects of experience are (for the individual) phenomena of consciousness; it lies in the standpoint from which the facts are viewed. The positive sciences deal with objects of experience, regarded as objects existing in themselves, without reference to the minds which know them; while Psychology deals with them as facts in the consciousness of a typical individual, and seeks to analyze and classify them in reference to other facts of consciousness, and to explain how they arose by pointing out the other facts of consciousness which are necessary to their occurrence. "The standpoint of Psychology is individualistic; by whatever methods, from whatever sources, its facts are ascertained, they must—to have a psychological import—be regarded as having place in, or as being part of, *some one's consciousness*. In this sense, *i.e.*, as presented to an individual, 'the whole choir of heaven and furniture of earth' may belong to psychology." Psychology is thus distinguished from other sciences by the way in which it looks at experience, not by the allotment of any special field of experience.²

This is no doubt true as far as it goes. But observe that much the same thing may be said of other general sciences, *e.g.* Chemistry. All objects of material experience belong to Chemistry, but belong to

¹ See § 7, below.

² Ward, article "Psychology," in "Ency. Brit.," p. 88.

it only when looked at in a certain way, namely, as constructed of different kinds of matter. And, note further, that some facts of consciousness can hardly be looked at from any other than the psychological point of view. A desire, or an emotion, cannot be regarded as having any objective reality answering to them, in the same way as the "real pen" answers to my sensations of sight and touch. They doubtless have a physiological basis, some modification of nerves and muscles which is somehow or other connected with them; but so have the sensations of sight and touch, while these latter have something else as well—the "real pen," the objective reality itself, whatever that may mean. We cannot say that Psychology looks at these facts of experience in a special way; because there is only one possible way of looking at them. By their very nature, and not by virtue of a mental attitude, they form part of the subject matter of the science.

We may add here that it is agreed by all that in Psychology we are not concerned with what the metaphysicians call the *substance* of Mind, but with its phenomena or manifestations. Mind manifests itself as Thought, Feeling, and Volition; it is natural to suppose that there is a something which wills, thinks, and feels, but modern psychologists are for the most part agreed that of this Something, apart from its attributes or phenomena, we can have no scientific knowledge; can (at most) only know *that* it is, not *what* it is.

§ 2. The Methods of Psychology: Introspection.

Psychology is thus a science which, like other sciences, has a subject-matter more or less clearly marked off. With this it deals as other natural sciences deal with their subject matter; it analyzes, classifies, and explains. Its logical method must necessarily be the same as that of the other sciences which deal with natural phenomena. It employs observation, deduction, definition, classification, and so forth, just as they do.

It is usually agreed that with regard to most of these processes there is no important distinction between Psychology and other sciences. Given his facts, the psychologist will employ the same methods of generalization, classification and explanation as other scientific workers. But a great deal of discussion has been expended on the point whether he gets his facts in the same way as they do; whether, in other words, the *observation* which the psychologist employs is of the same character as that which they employ.¹

On the one hand, it has been maintained that he employs a special sort of observation, called Introspection, which differs materially from all other kinds. In all other observation, the mind is turned outward, to objects other than itself; in introspection it is directed on itself. This bending of the mind back on

¹ On Observation in Science, see Ryland, "Logic," chap. xv.

itself was called by Locke, Reflection, though this use of the term is of course not quite the usual one. "It is that notice which the mind takes of its own operations and the manner of them;" and "though it be not sense as having nothing to do with external objects, yet it is very like it, and might properly enough be called Internal Sense."¹ This name, Internal Sense, is very unsatisfactory, but it has been frequently employed since Locke's time. Dr. Ward points out, among other objections to it, that this so-called sense has no proper sense-organ like the true senses, and apparently has no cerebral centre corresponding to it; and that we do not by means of it receive sensations differing from all other sensations in quality, but recognize by means of it "certain relations among pre-existing presentations," in other words, that it is a phase of our mental activity and not of our mental receptivity.²

Introspection then must be regarded only as the direction of attention to our own mental phenomena. When I perceive a house, I may centre my attention on the fact of perception, instead of on the results of perception; and thus I pass from what is called an objective attitude to what is called a subjective attitude. The central feature is no longer the object seen, but rather the way in which I, the subject, perceive the object.

¹ Locke, "Essay Concerning Human Understanding," bk. ii., chap. i., § 4.

² Article "Psychology," in "Ency. Brit.," p. 37.

When we compare Introspection with ordinary or external observation, we see that it has certain disadvantages.

(1) It is confined to the mental phenomena of the individual. It is subjective and isolated. My introspection can at best only give me *my* mental states; and your introspection gives you only your mental states. You cannot examine mine in order to see if you agree with me in my account of them; nor can I examine yours. And we do not feel by any means certain that all men (as, *e.g.*, savages, and blind people) think and feel just alike; so I have no right to assume that the mental phenomena you perceive by introspection are similar to those I perceive by introspection. This puts us at a grave disadvantage, since scientific method requires us constantly to correct our observations by comparison with those of others, and not to rely much on those results which are incapable of being thus repeated and verified.

Further, we cannot therefore apply to purely introspective data any comprehensive system of comparison; in other words, we cannot easily erect a Comparative Psychology on the facts given us by self-consciousness.

If we refer to the mental states of others, we have to rely on our own observation of their actions, or on their own accounts of their states of consciousness. How do I know that what you call the sensation of green, or the feeling of nausea, is *exactly* like what I mean by those terms? And when we try to

extend our researches to savages, children and the lower animals, their own introspection is, of course, no longer available. A Bushman or a baby is incapable of introspection.

(2) Introspection is thus confined to adults, and to those adults who are of a more or less highly intellectual character. The attempt to fathom the feelings and ideas of savages and children by asking them to tell us what they feel and think is very likely to mislead us; since they are quite incapable of observing, with any approach to accuracy, their own mental states. Anthropologists are only now beginning to realize the difficulty of interpreting the accounts which savages give of their own ideas and feelings in matters of religion and morality.

Human beings differ a great deal more in their mental phenomena than the older psychologists imagined; and the contents of the mind of the trained psychologist must not be lightly assumed to be the normal contents of the average human consciousness.

At the same time, by judicious treatment, valuable results may sometimes be obtained by an appeal to the introspection of children, and others not specially intellectual, as Mr. Francis Galton, for instance, in his inquiries on the subject of visualization,¹ has abundantly proved.

(3) Introspection transforms the objects observed. When we begin to reflect on a mental phenomenon,

¹ See his "Inquiries into Human Faculty."

say a paroxysm of anger, the emotional condition which we begin to observe, disappears and gives place to a state of an intellectual character; the anger vanishes for the very reason that we have begun to be conscious of it as a fact to be observed.

(4) Connected with this difficulty is another. We must remember that our mental states are very evanescent. Consciousness is only maintained by reason of a constant change in the elements of our mental states. Hence what we observe is commonly not the original state we wish to observe, but a new state, made up partly of the original state as remembered, partly of the effort to attend to it, and partly due to other changes in the content of our consciousness.

Our knowledge of states which have entirely gone by must clearly take place by memory. I cannot directly examine how I felt yesterday at dinner time, and compare it with how I feel to-day. At best I can only *remember*, and compare the remembered experience with the present experience.

These last two objections have been emphasized by Kant and Comte and other writers, who have in fact maintained that accurate introspection is impossible, and that on that account Psychology must manage to do without it. To this extreme position several replies are possible.

The objection last urged may be made against all observation whatever, as G. H. Lewes points out. If we try to observe an object in motion, say a bird flying, "the movement we observe is really effected

before our observation is completed ; it was a series of successive positions in space ; we retravel through that series ideally, connecting the point of arrival with the point of departure. It is because we recall these points that we know there has been a movement. It is thus also with the movements of thought. The part of pure observation, *or direct beholding*, is the same in both ; and in both it has to be completed by reflection, *indirect beholding*, which re-forms the particulars into a whole."

Introspection takes place by momentary diversions of attention. Such momentary diversions from the objective to the subjective attitude, do not materially change the character of the observed state. Similar instantaneous deflections of attention are necessary in other observations, *e.g.*, when the astronomer glances from the eye-piece to a vernier or other measuring arrangement, or when the orator wonders for a fraction of a second whether his words are making the impression he wishes, without interrupting the sentence he is uttering. As we shall see, the flow of ideas is not in a single straight line ; at no time is the mind occupied entirely on a single thought. Subsidiary trains of ideas may to some extent run parallel with the principal train without interfering with it. Introspection is a special case of this.

(5) At the same time it must be granted that, not only is verification impossible, but also that the observer cannot apply a direct system of measurement to his own mental phenomena. This is partly

due to the fact that they do not occupy space, while spatial measurement is much easier than any other. We measure time and temperature, for instance, by reference to space. It is also partly due to the fact that the comparison of the intensity of different states is always a comparison of two remembered states, or at least of one remembered state and our present state. A third reason lies in the absence of a standard which can be directly applied.

Whatever may be the defects of introspection, without it we should not be aware that mind existed at all. We recognize mental phenomena as such only through introspection; without some elementary observation of our own mental states, we should not know that there was such a thing as consciousness.

§ 3. The Objective Method.

Under this name several more or less distinct methods of observation are included. They all agree, however, in appealing to something more than the direct observation by one person of his own mental states.

(1) There is the method of Indirect Introspection. We may apply to others and ask them to describe their own mental phenomena. We may put full trust in their introspective powers, by giving them a free hand to describe the phenomena as they like; or we may limit them by making them answer set questions, drawn up by ourselves. The value of the results will

depend on the general intelligence of the subjects, on their special introspective ability, and on their accuracy in the use of language.

By confining our inquiries to persons of considerable intelligence and some introspective power, accustomed to express themselves with accuracy, we may gain results of very considerable value, which may be used to modify the results of direct introspection into our own minds. Such inquiries are now often undertaken by psychologists on a large scale, as by Mr. F. Galton on visualization (visual imagination), and by Professor Ribot on the nature of the representative factor in conception. Statistical methods are often applied, and the results expressed in tabular form.

(2) Allied to this, is the method of Experimental Psychology, in which, however, no notice is taken of the alleged contents of the mind. Questions are asked, but only with a view to note such phenomena as the degree of success with which attention is fixed or facts remembered.

Thus, to take one example out of many, Münsterberg and Bigham recently performed a series of experiments to discover the degree of influence exercised on memory by the nature of the sensorial organ through which the impression to be remembered was received. Five persons of about twenty-five years of age were taken, and to each were presented a series of figures and a series of colours. A visual series was formed by exhibiting each figure (or colour) for two seconds; and an auditory series by naming the numbers (or

colours). The subject or person experimented on was required to reproduce the series of figures (or colours) in the same order. It was then found that on the average more errors were committed in reproducing the auditory series than in reproducing the visual series, the failures being 31.6 per cent in the case of the string of spoken names, and only 20.5 per cent. where the colours or figures were shown to the eye of the subject.¹

This may serve as an illustration of the sort of work being done in the way of experimental psychology, properly so called, at the present time. It is a line of research which is full of promise, though at present it has not been much applied to the phenomena of judgment and reasoning, and still less to those of emotion and volition. Its main successes have been in the direction of sense-perception and memory.

Observation and experiment may be applied to babes, idiots, and animals, where no clear answers can be given by the subjects, or where the mental faculties are so different from those of the adult civilized man that only external observation is possible. Such experiments as those just now described are obviously inapplicable to quite low grades of intelligence. We cannot examine the power of imagination, or of visual memory, which a dog possesses, in the same way as we can those which a man or an intelligent child

¹ See "Psychological Review," i., p. 34; or "L'Année Psychologique," 1895, p. 411.

possesses. At the same time the methods we employ will be only an extension of those last described. We can, for instance, watch how often a chick, one day old, picks up a seed which he pecks at, how many times a dog requires to see a person before he recognizes him, and so on. But we can no longer assume that there is anything at all resembling the contents of our own minds in those of the chick or the dog.¹ We may learn how such minds react, but we can only hope to get a very slight acquaintance with the contents of them.

§ 4. The Physiological Method.

Another non-introspective method demands attention :

(3) We may throw light on some of the problems of psychology by means of physiological and anatomical investigations. Mind and body are so closely united that it is probably impossible to affect one without making some difference to the other.

(a) This investigation may take a purely physiological form, without taking into immediate and direct account the facts of consciousness at all. Thus we may examine the variations in the blood supply, and the temperature of the brain, when it is stimulated through the organs of sensation.

(b) Or it may take consciousness into account, and

¹ See Lloyd Morgan, "Comparative Psychology," p. 50, *sq.*

seek to correlate the two sets of phenomena. This is the method of Psychophysics, which, according to Fechner (who first regularly applied it), deals with "those physical activities which are the conditions of the psychical activities, and stand in direct functional relation to them." The term is, however, used very loosely, so as to cover, on the one hand, phenomena which we have just now described as purely physiological, and on the other so as to restrict it to a small part of the field where the phenomena of mind and body meet, viz., certain phenomena of sensation.

The chief part of Psychophysical research has been given to experiments to determine the exact way in which the intensity of a sensation is affected by changes in the intensity of the stimulus. Indeed, the formula arrived at by Fechner¹ to express this relation, is often called *the* psychophysical law, although it only deals with a very small part of the relation between psychical and physical phenomena. Other inquiries to which the name psychophysical is specially applied, are those dealing with the time occupied by sensation and movements determined by it (Reaction-time).

In a wider sense the term is applied in such a way as to cover such inquiries as those of Münsterberg, described in the previous section; that is, all inquiries in which experiment can be applied are called psychophysical. But this is unusual.

¹ See p. 80, below.

The biological method has been of considerable service in psychology. A remarkable continuity, or at any rate parallelism, has always been noticed between the phenomena of life and those of mind. Actions accompanied by consciousness shade off into reflex actions; the physiological mechanism of sensation has a most important part in determining the psychical character of the sensation. Further investigation leads us to suppose, that wherever we have consciousness, we have physiological activity. Now, biological inquiry is, in some respects, easier than introspection, direct or indirect. And, as Lewes says: "What is known of Life will be the best guide to what is knowable of Mind."¹ We not only get facts from Biology, but we get concepts. In other words, if we are trying to understand what takes place in the mind, we are much less likely to go wrong if we apply ideas derived from the biological sciences, than if we apply ideas derived from Chemistry or Physics. Thus, we may speak of Mind as a living thing which grows, which has an environment, and so on, with less danger than we may speak of it as a force, or a system of forces.

A good statement of this position, which would be accepted, in the main, by nearly all modern psychologists, may be quoted from Professor Huxley's work on Hume (in the "English Men of Letters" series): "Psychology is a part of the science of life or biology,

¹ "Problems of Life and Mind," 1., p. 110.

which differs from the other branches of that science merely in so far as it deals with the psychical, instead of the physical, phenomena of life. As there is an anatomy of the body, so there is an anatomy of the mind; the psychologist dissects mental phenomena into elementary states of consciousness, as the anatomist resolves limbs into tissues, and tissues into cells. The one traces the development of complex organs from simple rudiments; the other follows the building up of complex conceptions out of simpler constituents of thought. As the physiologist inquires into the way in which the so-called 'functions' of the body are performed, so the psychologist studies the so-called 'faculties' of the mind. Even a cursory attention to the works and ways of the lower animals, suggests a comparative anatomy and physiology of the mind; and the doctrine of evolution presses for application as much in one field as in the other" (Huxley's "Hume," p. 50).

Psychology is thus a science closely related to Biology, resembling it in method, and to some extent depending on it; but differentiated from it by assuming a new ultimate fact, the existence of Consciousness, which is furnished us by Introspection. This new fact demands a special addition to the method of Biology, and we accordingly couple Introspection with the observation of external, or objective, existence.

A more extreme view is held by certain writers (Comte, Maudsley, etc.). Mental phenomena they re-

gard simply as a class of physiological phenomena. They hold that mental phenomena are capable of being certainly known only on their physiological side, viz. the changes in brain, nerves, blood-vessels, etc., which accompany them, or produce them. Consciousness is a mere *epiphenomenon*, a by-product, which must be disregarded if we are to arrive at any scientific knowledge of man's nature. Man may, for purposes of investigation, be regarded as an automaton, which is conscious of itself, but in which the consciousness has absolutely nothing to do with the working of the machine.

We must not forget that we know much more of the laws of mental phenomena than we do of the anatomy and physiology of the brain. "Much of what passes for physiological explanation of psychological processes is simply the translation of these processes in terms of hypothetical physiology. For any one to propose an explanation of mental processes by adducing imaginary connections between mental elements having imaginary properties, is to explain the imperfectly known by the unknown."¹

The important thing, as Mr. Stout says, is to discover "Under what conditions is it possible from data supplied by the physiology of the brain to deduce psychological truths of which we have no previous or independent knowledge?"² Nearly all the recent discoveries in cerebral anatomy and physiology derive

¹ Lewes, "Study of Psychology," pp. 114-115.

² "Analytic Psychology," i. 30.

their whole meaning from psychological considerations. Indeed, Psychology has, perhaps, rendered more help to Physiology than it has received from it.

§ 5. The Sociological Method.

An important advance (at present hardly recognized with sufficient clearness by psychologists), has been made in the method of Psychology as the result of sociological research. Man lives in Society, he is a unit of a complex organism; hence, the individual is largely determined by the structure of which he forms part. Society develops powers which do not exist in the separate individuals which compose it. We can adequately study Man only by studying Humanity. We must therefore take into consideration not only data derived from Introspection and Physiology, but also Sociological data—such as are furnished us by Language, Law, Religion, Art, and History. This view, which is associated in Germany with the names of Steinthal and Lazarus, has been put forward in England by the late G. H. Lewes.¹

“The co-operation of the medium is not less indispensable than that of the organism; and in the case of man the medium is constituted by the education of the race and of the individual; so that the state of social evolution which has been reached at any given time in any given place, will be one of the necessary

¹ “Problems of Life and Mind,” i. pp. 152 *seq.*; “Study of Psychology,” pp. 71 *seq.*, and 159 *seq.*

determinants in every individual mind." Only by relation to the General Mind as embodied in Language, Law, etc., do we come to have "conceptions, theories, and virtues." Language, above all, is of supreme importance: it enables each of us to "share in the general fund [of experience] which thus becomes for him an impersonal objective impulse."

§ 6. Genetic, Comparative, and other Methods.

Two or three loosely used terms often met with may be here explained.

We may employ Introspection, Psychophysical Experiment, the purely Biological, or the Sociological method, (1) to analyze and classify the phenomena, or (2) to trace the formation of the more complex from the less. If the former, we follow what is called an *Analytic* method, and if the latter what is called the *Genetic* method.¹

By "Physiological Psychology" we may understand Psychology treated more or less from a physiological point of view. The result of direct introspection, or of comparison of the contents of other minds, will only be alluded to incidentally; and most attention will be given to the nervous and cerebral conditions of mental

¹ The term "method" is employed here in a slightly different sense. Introspection, experiment, etc., are methods of *obtaining data*. Analysis, comparison, and the genetic method are *ways in which we deal with data*.

phenomena. All the field of psychophysics, even in the widest sense, belongs to it.

By "Comparative Psychology" we mean the method which gets its materials by examining the mental phenomena, or the psycho-physical phenomena, of various classes of minds, especially those which differ from the normal civilized adult mind. Systematic observation of infants, savages, lunatics, and the lower animals, besides its own special interest and its value as a guide in education, medicine, politics, and so forth, may throw light on the operations of the normal adult civilized mind. Pathological Psychology (so far as it is purely scientific and does not concern itself with the art of medicine) is really a branch of Comparative Psychology.

§ 7. Relation of Psychology to other Sciences.

The relation of Psychology to Biology has already been referred to, and need not be further discussed.

Whether regarded as a special branch of Biology, or as an independent science (which, however, gains both materials and methods of dealing with them from Biology), Psychology must be regarded as a Natural Science. It does not deal, like the abstract sciences, with a single phenomenon (Consciousness or Mind) regarded apart from the individual things in which it is embodied. It deals with actual concrete minds, and seeks by observation and induction to formulate

general truths which apply to them. "To the psychologist," says Professor James, "the minds he studies are *objects* in a world of other objects; Even when he introspectively analyzes his own mind, and tells us what he finds there, he talks about it in an objective way. He says, for instance, that under certain circumstances the colour gray appears to him green, and calls the appearance an illusion. This implies that he compares two objects, a real colour seen under certain conditions, and a mental perception which he believes to represent it, and that he declares the relation between them to be of of a certain kind. In making this critical judgment, the psychologist stands as much outside of the perception which he criticizes as he does of the colour. Both are his objects. And if this is true of him when he reflects on his own conscious states, how much truer it is when he treats of those of others." ¹

Like the other Natural Sciences it observes, classifies, and formulates laws (of causation or mere sequence). Unlike the Abstract Sciences it does not proceed mainly by Definition and Deduction.

During the scholastic period and that period of neo-scholasticism which succeeded it in Germany, Psychology was sometimes treated as a deductive science, or at least as having a deductive part. For instance, Wolff (died 1754), who systematized the current Leibnitzian teaching of his time, discriminates between

¹ "Principles of Psychology," i. 183-184.

empirical psychology and *rational psychology*. The latter is a purely abstract science which, starting from a definition of the soul, seeks by deduction to arrive at certain universally true and necessary propositions. With this pseudo-science, which received its death-blow from Kant, the modern psychologist has nothing to do.

Some confusion has, however, been caused, and psychologists have occasionally been unjustly attacked, on account of the confused use of the term *Metaphysics*.

As employed before the time of Kant, and to some extent since his time, Metaphysics has properly meant the real or imaginary science which deals with ultimate Being or Reality as opposed to the phenomenal world known by experience. This inquiry is nowadays usually known as *Ontology*, and is generally regarded as having no validity. To it belonged *Rational Psychology*, *Rational Cosmology*, and *Rational Theology*, which professed to embody what could be known *à priori* of the Soul, of the Universe, and of God, from pure thought without the aid of perception.

As employed to-day *Metaphysics* means the discussion of those fundamental concepts which underlie all knowledge, whether scientific or ordinary. Even the most precise scientific man does not burden his pages by discussing at length such terms as *Space*, *Time*, *Cause*, *Thing*, *Reality*, *Consciousness*, *Experience*. He assumes that his reader knows what he means by the words; and he leaves them unanalyzed.

The business of the Metaphysician is to take them in hand and try to see exactly what they imply. He will thus be concerned mainly with definition of terms and not with real things ; and his method will be deductive rather than inductive. His inquiries will be abstruse, refined, and puzzling, and thus " metaphysical " has come to be employed to designate any far-fetched, unobvious doctrine or method.¹

Now Psychology is not only far-fetched and unobvious to the plain man, but it also deals with some of the very terms with which the old ontological or the modern critical Metaphysics deals, only in a different way. Metaphysics tries to show us what Space, Time, etc., mean ; Psychology tries to show us how the ideas of Space, Time, etc., grow up in the mind of the individual. Psychology does not discuss the question whether anything really exists which answers to them ; it only discusses the question how they come to exist in my mind. Thus the psychologist shows how a child arrives at the notion of things existing in space ; but he leaves to the metaphysician the inquiry what we really mean by a thing existing in space. Psychology is descriptive ; metaphysics critical.

The fact that Psychology, however, constantly dealt with many of the same terms and ideas as Metaphysics, coupled with the fact that it was an almost equally slippery and uncomfortable subject to the plain man, led to a confusion between the two ; and

¹ Compare, for instance, Dr. Johnson's expression, " the metaphysical poets."

many great thinkers have constantly slipped from psychological into metaphysical inquiries and back again without knowing it. This was the case with Locke in his day, and with Mill in his. The latter, for instance, gives a psychological account of how we came to know Space, and then assures us this is a complete analysis of what we mean by Space. In fact the word Metaphysics came to be generally used to cover both what we call Metaphysics and what we call Psychology. This wide use of the term is now abandoned, and we have reverted to the earlier usage which makes a distinction between the science which investigates the phenomena of the mind, and the science which (as the older writers would say) deals with real being, or which (as the modern writer would say) examines the meaning and validity of our ultimate concepts.

Between Logic and Psychology the line is more easy to draw. Logic is, from one point of view, more limited in range than Psychology. It ignores emotion and volition. Even the field of perception, of memory, and of imagination, Logic does not touch ; and in so far as it deals with conception, judgment, and reasoning, it deals with them only as means of arriving at correct inferences. Logic has nothing to do with mental phenomena as mental phenomena.

The logician does not seek to classify and explain even those mental activities which are exhibited in the act of inference ; but to classify and explain the forms into which they must be thrown if their results are to be regarded as valid. Psychology is descriptive, while

Logic is critical and, above all, regulative. The logician does not offer the syllogism as the way in which men do actually reason from general truths to particular cases, or the scheme of dichotomous division as the way in which men do actually classify, but as forms into which such processes should be thrown if they are to be unchallenged and unchallengeable. Again, Logic deals only with thoughts expressed in some form of language, while Psychology deals with intellectual processes which are to some extent antecedent to, and independent of, language.

CHAPTER II.

CONSCIOUSNESS AND SUBCONSCIOUSNESS.

§ 1. Consciousness.

THE term Consciousness has been ambiguously employed, but we may specify two or three main uses.

(i) It sometimes denotes only the recognition by the mind of its own states, which is sometimes called Self-consciousness, and which when precise and continuous we call Introspection. It is "the inner presentation of our sensations, ideas, and feelings." (Höfding).

(ii) It sometimes is used as a generic term to include all mental phenomena, with or without explicit reference to the Ego. In this sense it includes phenomena of Sub-consciousness. "Consciousness is the word which expresses, in the most general way, the various manifestations of psychological life. It consists of a continuous current of sensations, ideas, volitions, feelings, etc." (Prof. Ribot.)

(iii) It sometimes is used as equivalent to any kind of Immediate Knowledge (Intuition)—whether of external things or of states of mind. "Consciousness

and immediate knowledge are terms universally convertible." (Sir W. Hamilton).

Hamilton, however, uses the word in all three senses; so do many other psychologists. This has caused a great deal of intricate and somewhat uninteresting discussion.¹ There is now a tendency to use the word more exactly in the second sense discriminated above. Taking the term in this sense, "Consciousness is to Mind what Extension is to Matter. Though both are phenomena, yet both are *essential* qualities, for we can neither conceive mind without consciousness, nor body without extension." These words of Sir W. Hamilton's state the view taken by common sense, as formulated by Descartes; though they are not easy to reconcile with the doctrine of Unconscious Mental Modifications, at any rate as stated by Hamilton himself.

The third meaning is seldom employed by recent writers, and had better be entirely dropped. As used by psychologists to-day, Consciousness is said to exist only of mental phenomena.

The other two senses of the term may be combined. Consciousness is immediate knowledge (or awareness) of the mind's phenomena, and it is a generic attribute of all mental phenomena.

In recognizing consciousness as "the inner presentation of our sensations, ideas, and feelings," we give it an intellectual character; and we to some

¹ Cf., e.g., Hamilton, "Lect. Metaph.," i., pp. 206 *seq.*; Mill, "Examination of Hamilton," pp. 138 *seq.*

extent commit ourselves to the view that intellect is more fundamental than feeling or volition.

When we consider the accounts here given of the meanings with which the term consciousness is employed, we see that they are in no real sense definitions. Consciousness is only definable by using words like "recognition," "knowledge," "awareness," which imply the very same idea. Even if we avoid giving any statement of its connotation and merely say that the word denotes "all mental phenomena," we shall find that the term "mental phenomena" is only explicable as "phenomena of Consciousness."¹

Two general conditions of Consciousness may be laid down.

(1) The existence of variation among the presentations or ideas.

(2) The grouping of these varying impressions by a knowing subject.

In other words for consciousness to exist we must have constant change among the presentations, and the combining of these varying presentations into a series.

§ 2. The Law of Relativity.

Long ago Hobbes expressed the need for variation in these words: "*Semper idem sentire ac non sentire*

¹ See chap. i., § 1.

ad idem revertunt.” Were an undifferentiated single sensation the only content of consciousness, consciousness would disappear. When the hypnotic patient has fixed all his attention on a single point of light and has become oblivious of everything else, he is in a fair way towards unconsciousness. We all allow many customary impressions to pass unnoticed, because their want of variety prevents them from affecting us. It is only when the timepiece suddenly stops, that we wake up to the fact that it has been ticking.

Hamilton states the condition thus: “We are only conscious as we are conscious of change;” but this Law of Variety, as he calls it, is open to an objection. There need be no clear recognition of the change in the contents of consciousness, though the change must have occurred. As Ward says, we must distinguish between a “difference of presentation,” which really is a necessary condition of consciousness, and a “presentation of difference” which is not. But there is always a transition of the mind, and we are conscious of this transition, though not necessarily *as* a transition.

A special development of this truth is called the *Law of Relativity*; and this is accepted by all psychologists, though they differ somewhat in their statement of it.

It is thus enunciated by Dr. Bain: “As we neither feel, nor know, without a transition or change of state, every feeling and every cognition must be viewed in relation to some other feeling or cognition. There

cannot be a single or absolute cognition." Every presentation is determined partly by what we may call its own intrinsic character, and partly by the character which it derives from its position in the series of states of consciousness. The former is called by Dr. James its "substantive aspect," and the latter its "transitive aspect." Dr. Bain sometimes uses language which suggests that he altogether disregards the intrinsic character of the presentation, and that he regards the second as of sole importance. But this is probably an oversight.

Höfding gives the Law of Relativity thus: "From the moment of its coming into being, the existence and properties of a sensation are determined by its relation to other sensations." And he adds that the law applies to all ideas and concepts, and to feelings and volition.

Wundt states the Law of Relativity in a different form, viz., "that we apprehend the *intensities* of stimuli not according to any fixed unit given along with or before the impression itself, but in general only according to their mutual relations." Thus light and dark, hot and cold, are only known in reference to the previous state. Water of a given temperature is hot or cold, according as we have previously experienced water which is colder or hotter. This, however, must not be pressed too far; we must not regard the "substantive aspect" of the presentation as having no importance, whether we speak only of its intensity, or of its general qualitative character.

§ 3. Assimilation.

Mere change in the contents of consciousness is not, however, the only condition. The changing presentations must be grasped and brought into relation with each other, and with previously experienced presentations. Mr. Spencer expresses it thus, "In being known, each state must become one with certain previous states—must be integrated with these previous states." All consciousness involves a continual rhythm between these two processes of differentiation and integration.

How come fresh impressions to be worked into the general tissue of experience and integrated with impressions already received?

Excluding purely physiological attempts at explanation, two theories are presented for acceptance:—

(1) That the integration is somehow due to the impressions themselves, and that they act in this way simply because it is their nature so to do; just as atoms of matter are attracted towards each other by the forces of gravity, cohesion, chemical affinity, and so on.

(2) That the integration is due to the action of the mind itself.

(1) According to the first theory, then, the mind is nothing but an arena, in which the mental elements may go through their work of combination. It is a stage whereon the performance takes place, and not an actor in the play. It is the ideas which do everything. This is the view of the Association school, of

which Dr. Bain and Mr. Spencer in England, and Herbart in Germany are the most illustrious exponents.

They regard the whole fabric of our mental life as due to the interaction of ideas, which they speak of as individual things having their own characters and qualities, apart from the particular mind to which they belong. My consciousness is of no importance in the development of my ideas, it takes no share in the business; at most it is merely like a containing vessel, a chemist's test-tube within which reactions go on, but which has no power of interfering in the process.

Mr. Spencer, it is true, thinks that other forces come into play besides those which are inherent in the ideas present at any given moment. New impressions are modified because there are remains of earlier impressions. The test-tube is not perfectly clean; and what goes on within it is affected by the results of previous experiments. But he will not admit that the test-tube itself takes a share; in other words, he does not rise from the level of a chemical to that of a biological analogy. It is true he uses biological terms, but he does not conceive of the *mind* as a living activity. It is the bodily organism which really does the work of assimilation.

(2) According to the second theory, the mind actively interferes, arranges, combines and analyzes, while the ideas do nothing. This active energy of mind is what Kant calls "the pure ego," or the "transcendental subject of thought." It is not what we usually mean by

Self; it is not the Self that is constituted by a definite set of memories and a definite way of feeling on the occurrence of a given stimulus; the Self which likes poetry and dislikes tobacco, which remembers Brown and has no recollection of Jones, which gets into a passion when Mr. Gladstone or when Lord Salisbury is mentioned. This concrete Self Kant taught us to call the "empirical ego," because we get to know it by experience very much as we get to know anything else by experience. By the "pure ego" he means merely the recognition that "I am conscious," that the logical subject and predicate of a judgment are somehow united in what I call my consciousness. *I* am aware that "S is P," *you* who are not thinking about S or P are not aware of it. This union of S and P in one consciousness, the forming of the judgment itself, is the whole work of the "pure ego." In other words, we are obliged to make this assumption, in order to explain the existence of knowledge. "S is P" must exist for some mind; it is not a judgment until some mind holds S and P together in the particular *nexus* we call a judgment.

We may make a distinction between the assumption that all knowledge involves a reference to a conscious subject, and the assumption that this conscious subject is an activity which selects and combines the material of consciousness.

Association of ideas, perception, judgment, and in fact all the processes by which knowledge is added to, or brought before the mind, involve this essential activity of assimilation. Whenever an object is recog-

nized, or a thought is brought into vital connexion with other thoughts, we have the assimilation or synthesis of cognitive elements.

§ 4. The Unity of Consciousness.

“Everything mental is referred to a self,” says Dr. Ward. This does not mean that every thought or feeling of which I am conscious is thought of as mine directly it occurs; but that it is grouped with other facts of consciousness in a certain relation to a single centre of knowledge, an individual, knowing activity. What *you* have just experienced *I* do not know, because the presentation has not come within the sphere of my own knowing activity. It must come into the series of presentations which have become a series because they have occurred to the same subject or knowing mind, that which I call mine. Consciousness implies a subject knowing, as well as an object known. And it implies that this subject is relatively permanent and continuous; otherwise a series could not be constituted.

The doctrine that “a series of feelings [*i.e.*, states of consciousness], can be aware of itself as a series” is meaningless. It is only the fact that all the “feelings” occur to me, to the same me, that makes them a series at all.

This view does not necessarily imply that the subject remains the same and unchanged during the whole of the physical life. The series which it links together,

however, so long as it remains a series, implies a unity of activity, an unchanged centre of psychical energy.

It may be asked, Does not the fact that the mental series occurs in, or to, the same organism imply a sufficient unity? Is not the unity of consciousness merely the consequence of the unity of the bodily organization? To this we may reply, that even if it were true, we cannot in a psychological analysis introduce a purely biological fact. Even if psychological unity be the consequence of physiological unity it is not the same thing; it belongs to a different plane of existence. Let us grant that all mental states are consequences of changes in brain and nerves, we cannot, in giving an account of what is before our minds—in analyzing an emotion, for instance—suddenly insert a description of our cerebral condition as a part of our mental series.

And further, the unity of the organism cannot be shown to be the condition of mental unity. Passing over the fact that the whole material of the body constantly changes, and that a period of a few weeks probably sees all except the bones entirely renewed, we notice that there is every reason for thinking that the lower organic beings are without mental unity. And yet an oyster is just as much an organic unity as a philosopher. Further, the examination of pathological states shows us that the body may remain the same and yet the psychological subject may be entirely changed. In cases of double consciousness, and in some hypnotic conditions, the old mental series is

entirely interrupted for a time, and its place is taken by a new one, which is apparently as entirely unrelated to the former, as if they had belonged to minds inhabiting different bodies. ✓

§ 5. Degrees of Consciousness.

Consciousness varies in degrees. We are all familiar with the gradual decline of consciousness which takes place when we fall into a doze. And we notice that individual impressions get weaker—that the same stimulus does not continue to impress us as strongly as it did at first. In the same way an idea which a few moments ago stood out vividly in the mind, now, as we begin to think of something else, becomes rapidly dim, though not so dim as to seem unfamiliar if a turn in the conversation should bring it back.

We thus discriminate between the fullest consciousness of ideas, often called the *focus of attention*, and the sphere of dimmer consciousness lying about it, often called the *field of attention* or *field of consciousness*. A presentation which has occupied the focus of attention at one moment, passes off into the peripheral field of attention. This is only a metaphorical form of expression; but it is absolutely necessary to use metaphors of some kind when we seek to describe mental phenomena. And there is no great harm in thus calling attention to the analogy between the phenomena of mind and those of the external world, so long as we remain perfectly aware that we are

using analogical expressions. Besides, the analogy here is to a set of phenomena which have in them already an element of consciousness. Psychologists and physiologists have long been accustomed to say that an object which is just at the central point of vision, and the rays from which fall therefore directly on the centre of the retina, is at the focus of sight, and to distinguish this central point from the surrounding area of less clear vision.

The field of consciousness must not be regarded as always having the same extent, or indeed as having a definite limit of any sort. The further we get from the focus, the less clear will be the ideas, and it is impossible to say where consciousness leaves off.

§ 6. Subconsciousness.

What lies outside this area of marginal consciousness? Within it occur phenomena which are dim indeed, but which can at any moment be brought into the focus of attention. Outside it, may there not be a still wider area within which there may occur—we must not say phenomena, but mental facts, incapable under normal conditions of being brought into the focus of attention, but yet not wholly incapable of being so brought under certain special conditions?

This is the doctrine of unconscious (or subconscious) mental modifications, which asserts that the mind sometimes exerts energies, and receives presentations, without being conscious of them.

Sir William Hamilton was one of the first psychologists to point out clearly and with emphasis the existence of such latent mental modification. He points out that various kinds of latency may be recognized. There is that normal kind which belongs to all our knowledge, which we are not thinking of at the very moment. There is also that abnormal latency, which occurs when the mind contains whole systems of knowledge, *e.g.*, a language or a science, of which it is ordinarily unconscious, but which are revealed to consciousness in madness or delirium or in some other extraordinary psychical condition. But besides these, there is the very interesting case of unconscious mental modifications, which we know must have existed on account of the results which they have produced in consciousness. To establish the existence of these Hamilton appeals to certain facts of external perception, and to certain facts of association. The separate leaves of a distant forest must each produce some effect on our mind of which we are unconscious, in order to give the general impression of greenness, of which we are conscious. The murmur of the distant sea is a sum made up of the noise of separate waves, individually not strong enough to rise into consciousness. In these and similar cases, "the total impression of which we are conscious, is made up of an infinitude of small impressions of which we are not conscious." Again, in Memory, one idea often suggests another into consciousness by the intermediate agency of one or more other ideas which do

not themselves rise into consciousness. This may be represented by the well-known experiment with a row of billiard-balls; the motion is communicated from the first to the last through a series of spheres which are themselves unmoved.¹

This position is now very widely accepted by psychologists. The chief considerations which have led them to it are these:

(1.) The Law of Continuity is found to hold very widely in external nature, and we may assume that it holds in the sphere of consciousness. We find that the probabilities point in that direction. Presentations not attended to gradually fade.² Somebody tells me that Jones has broken his leg; this news occupies my mind for a minute or two, and then begins to lapse. As we go on talking, a third person comes in, and the fact of Jones's accident at once recurs to my mind, and I tell him of it. If he had come in to-morrow, the chances are that I should not have mentioned it, unless I had some particular reason for telling him. In a month's time the fact will scarcely ever come into my clear consciousness: in ten years' time I shall have a difficulty, even when I see Jones, of recalling that he ever had such a misfortune. But does the remembrance ever entirely disappear? We know that under abnormal conditions recollections apparently entirely lost come back to us. In the hypnotic condition people sometimes

¹ Hamilton, "Lect. Metaph." 1., pp. 338 *seq.*

² Sometimes called the Law of Obliviscence. See below, chap. viii., § 6.

recollect what they have apparently entirely forgotten. The same thing is true of patients suffering from delirium ; and that such revival occurs during drowning has been often asserted by persons who have undergone the process almost to the bitter end. May we not assume, then, that ideas go on getting dimmer and dimmer long after we have ceased to be able to recall them at will ? This is all that the doctrine really assumes. It does not necessarily imply that *no* idea once had can ever be entirely lost.

(2) The physiological activities which accompany or cause psychical activities vary in intensity. Apparently the psychical activity arises more or less suddenly when the physiological activity has gained a certain degree of activity. In fact, it seems like a case of what Mill calls "heteropathic effects."

A given tract in the cerebral hemispheres is active : but until a certain degree of activity is reached we have only what has been called "unconscious cerebration." Then suddenly consciousness appears. The main objection to this doctrine lies in the universality of the Law of Continuity. Continuity is the rule ; heterogeneous effects occur but seldom, and when an effect is heterogeneous, we usually find that a new condition is co-operating with the old conditions. If cerebral activity of a certain degree of activity produces (or is accompanied by) absolutely *no* consciousness, it is highly improbable that by merely increasing its intensity consciousness will arise.

It is much more probable that to every cerebral

modification there corresponds a mental modification: which, however, does not rise into consciousness unless the cerebral modification is sufficiently intense.

(3) We must assume that certain activities take place, because their *results* are present in consciousness. As Hamilton pointed out, the facts of perception, and the facts of memory, alike suggest that some of the elements of our mental states never rise into clear consciousness, but do their work "below the threshold."

Experimental investigation strengthens this assumption of a *sub-liminal consciousness*. A hypnotic patient, for instance, has been known to write an answer in reply to a whispered question, while the patient keeps up a conversation with a third person.¹ A woman, operated on while under the influence of an anæsthetic, and apparently quite unconscious, four days afterwards was attacked by neuralgia, during which she described quite accurately the whole operation.²

If this view be taken the term "sub-conscious" is perhaps better than "unconscious," since it suggests that the same quality of awareness or consciousness is really present, though in such an attenuated degree that it is not recognizable. Imagine a single candle placed in the midst of a huge circular cavern; it diffuses its light equally in all directions; and if we go even a hundred or two hundred yards away a certain

¹ See James, "Principles of Psychology," i. 203, *seq.*

² Paper by C. T. Green, in the "Journal of the Society for Psychical Research," March, 1894.

amount of light from the candle will fall on the page of an open book, though it may not be enough to discriminate the book from the surrounding darkness. That it is there we can see by interposing a sufficiently large double convex lens which will make the rays which fall on a large surface converge in one small point of grayish light. Something like this happens in the case of the mind. Even in the deepest sleep some degree of consciousness is present; when we are fully awake and are earnestly attending to an object of perception or thought, a very high degree of consciousness is present, and is focussed on the single object, and in between these two extremes are an almost infinite number of degrees. But if we employ this image of the cave we must remember that to render it at all adequate we must assume that sometimes a single candle, and sometimes a light of much greater power, is employed. And as said before, we are not committed to the statement that there is no such thing as an idea being absolutely lost to consciousness.

We have thus three grades of consciousness, viz. the degrees which subsist in :

- (1) The Focus of attention.
- (2) The Field of attention.
- (3) The Subconscious region.

CHAPTER III.

THE CLASSIFICATION OF MENTAL STATES.

§ 1. The Stream of Consciousness.

THE actual stream of consciousness consists of a series of more or less definite focal states, A., B., C., D., etc., accompanied by a number of other series of a marginal character. Thus as I go to the station there is the series,—clear morning—too rosy—rain later—glad I brought umbrella—the blinds are down at Brown's—is anyone dead? etc. Side by side with that are several other trains; I recognize a friend, I hear a bell and wonder dimly whether I shall catch my train. I see they have got the road up again, and so forth.

The first train of ideas and percepts suggested by the weather was broken by the intrusion into the focus of attention of another train starting from the percept of Brown's house; while the first train lapsed into a marginal position. And this rivalry of ideas is a constant feature of mental life. More in the background are other trains which hardly come into competition at all; thus on retrospection I see I was more or less conscious of a series of constantly varying slight pressure of boots and other articles of clothing; and of the sounds of my footfalls and of other

noises in the street, of odour from the ground which has been turned up by the roadmakers and so on.

The stream of consciousness is not always so extensive. If I concentrate my attention on a difficult problem, many of the competing trains disappear still further into the background. In the case of abnormally absent-minded people the entire victory of the train of thought or memory is shown by their actions. Socrates is not the only philosopher who has been known to stand bare-headed in the marketplace, not perceiving the passers by.

All the time, I am also dimly aware that my whole stream of consciousness is flushed with some special emotional colour. One morning I am in good spirits and hopeful; another, depressed because I have had bad news; a third, angry because I have missed a train I wanted to catch.

Besides which nearly every thought or percept that comes to me, carries with it some slight tinge of feeling—surprise, regret, satisfaction, and so on.

Along with ideas and feelings I am conscious of desires or strivings. I want to catch the train, and hurry along because I think I hear the bell; and stimulated by curiosity and neighbourly feeling I resolve to send round to Mr. Brown's to inquire if anyone is ill.

Something like this then is revealed to us by a cursory observation of our stream of consciousness. Let the reader sit down and ask himself what is at the present time before his mind; and if he is careful, he will be able to detect many secondary ob-

jects, as well as those in the focus of attention. But he will be liable to overlook certain features which are not prominent when he "sits down in a cool hour" of reflection; these are the feelings and desires which, as a rule, only become insistent at such times as those in which the notion of introspection is not likely to occur.

§ 2. The Supreme Genera.

THIS threefold division of mental phenomena is recognized by nearly all modern psychologists—Cognition, Feeling and Volition. The acceptance of this classification seems to have been due, in the first instance, to the influence of Kant. Before his time the usual division was dichotomous. The Scholastics and the followers of Locke agree in merely making a distinction between Intellectual powers and Active powers. Reid was one of the last psychologists who adopted it.

Spinoza and Wolff taught that feeling is obscure cognition. The psychology of Locke and Hume tended in the same way to regard feelings as special forms of intellectual activity. By Locke, all the actual contents of the mind are described as *ideas*; pain and pleasure are "simple ideas," derived like other "ideas" from "sensation" or "reflection." All the different passions, or types of feeling, are "so many instances of pleasure and pain," and are therefore, like them, only *ideas*. Will is, however, a power in us, like Thought, of which we can form an idea, but which is in itself something more than the idea, viz., a way of reacting

on ideas. In the same way, Hume makes the Feelings "secondary or reflective impressions," which arise in us in consequence of the presence of what he calls ideas, that is, remembered impressions.

The definition of these three supreme *genera* of mental phenomena is extremely difficult, and perhaps impossible.

Under the head of Cognition, or Intellect, are included Perception, Imagination, Memory, Conception, Judgment, and Reasoning. In all of these there is a presentation (what Locke calls an idea), and a tendency to treat this objectively, without reference to ourselves. In other words, the element of feeling is small and unimportant, and we can mentally separate the apprehension of a proposition, or the recognition of a person, from the feelings which accompany, or quickly follow it.

Those states in which Pleasure and Pain are prominent features are called Feelings, or Emotional conditions; but in these complex states, there are other elements besides those of pure feeling (pleasure and pain), viz.: images and conations.

Under the head of Conation, or Will, we include those complex conditions of striving or activity, which we call Desire, Instinct, and Voluntary action.

§ 3. The Psychical Elements.

These three well-marked genera are not the ultimate elements of mental states. They are, as we have seen,

all complex. The simplest elements which can be traced in consciousness are, says Dr. Ward :¹

1. Presentations.
2. Pure feeling, *i.e.*, pleasure and pain.
3. Attention.

By the first, he means what Locke calls ideas, "whatsoever is the object of the understanding when a man thinks,"² or, as we should say, when a man is conscious. By the third he means the activity which keeps presentations in the full light of consciousness, and arrests the tendency to change of presentation.

"Feeling and attention are not presentations," says Dr. Ward. We know of them only by means of their effects on our presentations. They produce certain changes in the character and succession of our ideas ; these changes we perceive, but we do not perceive that which causes the alterations. This is not in accordance with the ordinary statements of psychologists. But we must remember the distinction just drawn between Feeling and the Feelings. We are, no doubt, conscious that we are angry or pleased ; but the complete mental state ("psychosis") of anger or delight, although largely suffused with feeling, gets all its definite outlines from the presentations which cause the feeling, and the changes in the series of presentations which the feeling in turn produces.

Every complete mental state or psychosis involves all

¹ Article "Psychology," p. 44.

² "Essay," bk. i., chap. i., § 8.

these elements, Presentations, Feeling and Attention, though these are in varying degrees of importance. It is better to say this, than to say, as is usually done, that every mental state contains Thought, Feeling and Will: since Thought, Will and the Feelings (or emotional states) are in themselves complex and highly developed mental facts. What we usually mean by "Will" is not present in every mental state; but that particular factor in consciousness the predominance of which is a special feature in those psychoses, called Determination, Resolution, and so on.

It was Sir William Hamilton, who first clearly laid down the doctrine that three elements are present in every act of consciousness, though only one of them may be prominent. "In distinguishing the cognitions, feelings, and conations, it is not therefore to be supposed that these phenomena are possible independently of each other. In every, the simplest, modification of mind, knowledge, feeling, and desire or will,¹ go to constitute the mental state: and it is only by a scientific abstraction that we are able to analyze the state into elements which are never really existent but in mutual combination" (Hamilton, "Lect. Metaph.," vol. i., pp. 188-9). In the same way, every primary colour in the solar spectrums contains vibrations belonging to the other primary colours, and only owes its special character to the *predominance* of a

¹ Hamilton, like most psychologists, uses each of these terms to denote an *element* of consciousness, as well as a complex state characterized by the predominance of a given element.

certain class of vibrations. The late Mr. G. H. Lewes suggested therefore the somewhat fanciful name "Psychological Spectrum" ¹ to designate these facts.

In the earliest dawn of conscious life all three of the supreme genera, Thought, Feeling and Volition, appear together though in simple and indefinite forms, and are differentiated more and more clearly from each other as that life develops. So far as we can see, the child does not start with mere pleasure and pain, but with states which involve a presentative element, a feeling element, and more or less of the activity which we call attention.

Nor can we resolve the complex states of mature consciousness into feeling. Presentations cannot be analyzed into feelings and nothing more. Where this seems to be done, as in the writings of Mr. Herbert Spencer, it is due to the ambiguity of the word "feeling," which is used not only to denote emotional states, as already explained, but also for simple presentations, not regarded as having any immediate objective cause external to the body.

§ 4. Faculties.

If this is kept clearly before the mind, we are not likely to fall into the old error of regarding the mind

¹ Mr. Lewes's "Spectrum" is, however, not quite the same as Sir W. Hamilton's. His "three fundamental modes of [neuro-muscular] excitation" are Sensation, Thought, and Motion. ("Problems of Life and Mind," vol. i., pp. 146-147.)

as made up of a number of more or less independent Faculties, a doctrine which has been the source of considerable confusion in Psychology. There is no special faculty of Perception in general, which is alone exercised when we perceive; there is no special faculty of Memory, which preserves what has been handed over to it by Perception, and so on. The whole mind thinks, the whole mind feels, the whole mind wills. The faculties are not distinct entities, but modes of operation of the conscious mind. These modes of activity are not perfectly independent, but everywhere presuppose one another, and pass into each other. If evolution has taught us not to expect fixity and definiteness in the science of Life, but shows us species shading off into species, and function passing into function, we must not look for such fixity and definiteness in the science of Mind, which deals with phenomena still more complex and unstable.

Our object is to explain the phenomena of mental life on as few assumptions as possible. (1) We may assume either that every mental fact is due to some inherent and independent mode of reaction on the part of the mind—for this is what is meant by a "faculty;" or, (2) we may try to explain the phenomena by showing that the different methods of reaction are at bottom specific forms of one or two principal kinds of mental activity; or, (3) we may regard the mind as a blank, a receptive void without any special methods of reaction at all, and hold that all the contents of the adult educated mind are due to the

properties of the presentations themselves. The first position is that of most writers on psychology earlier than the present century. The second is that which is usually adopted now. The third is the assumption of the extreme Associationist school of psychologists, already spoken of. It will be discussed in the next section.

The great objections to the old "faculty psychology" are these :—(1) It loses sight of the essential unity of mind. (2) It loses sight of the extreme complexity of all mental processes. (3) At best it substitutes a classification of facts for an explanation of them. In fact, it lies open to the same objections as the older physiology, which, ignorant of histology and organic chemistry, spoke of the various organs of the body as essentially distinct things, each of which might conceivably have existed alone without reference to the organism as a whole. Modern physiology tries to trace the growth and differentiation of each organ, and to show how its special character and functions have come into existence; above all, it lays stress on the essential unity of tissue and of function, which underlies the striking differences. Much good work has been done by concentrating attention on each organ, and regarding it in isolation, but the modern biologist cannot rest here: he seeks to trace the interdependence of the organs, and their common character, and to explain how their specific structure and functions came into existence. In psychology the same change of method has occurred. Instead of studying memory

by itself, or will by itself, we try to see how they are related to other faculties, what they have in common with them, and how their own specific phenomena arise. The mind is for us no longer a set of more or less disconnected kinds of activity; but a spiritual unity in which there are diversities of operation. If we bear these considerations in mind, there is no serious objection to the use of the term faculty.

§ 5. Innate Ideas.

Descartes, the founder of modern philosophy, laid down that there are in the mind certain faculties or capacities for forming thoughts, which are born with a man. These are not ideas, but powers to form ideas. His own explanation runs thus: "I have never said that the mind has need of innate ideas, which are anything different from its power of thinking; but when I remarked that there were in me certain thoughts which did not proceed from external objects, but from the faculty of thinking which is in me, that I might distinguish the ideas which are the forms of these thoughts from others, adventitious or factitious, I called them *innate*, in the same sense in which we say that generosity is innate in certain families, in others certain diseases, as gout or gravel, not that, therefore, the infants of those families labour under those diseases in the womb of the mother, but because they are born with a certain disposition or faculty of contracting them."

Locke completely misunderstood Descartes when he attacked the doctrine of Innate Ideas, unless, indeed, we assume that he never intended to attack the Cartesian doctrine, but only that of the English Platonists like Lord Herbert of Cherbury and Henry More. His own view was not perhaps very different from that of Descartes¹—a better name for which would be connate faculties, rather than innate ideas. Locke asked the question, How can we be said to have ideas of which we are not conscious? But Descartes explains that he does not mean actual, but potential ideas, latent capacities for having ideas, which we certainly have. They are “forms of thought,” which require elements derived from sensation before they give rise to actual ideas.

The real question at issue is, whether the mind is a *tabula rasa*, a perfectly blank surface on to which sensations are projected: or whether it has certain definite, inherited methods of reacting when impressions are felt. The view almost universally accepted is, that our ideas are the product of two distinct factors, the one external and adventitious, the other the proper activity of the thinking subject itself. “To rest with the unqualified assertion, that, antecedent to experience, the mind is

¹ Locke advances such arguments as these:—That the hypothesis of Innate Ideas is not required; that such ideas are not perceived by children, but require reason to discover them; that we are not conscious of them, and, therefore, they do not exist; that universal acceptance does not prove them innate. See “Essay,” bk. i.

a blank, is to ignore the question, whence comes the power of organizing experience?"¹

As a matter of fact a merely passive reception of impressions, whether in the psychological or physical sphere, is unthinkable. Nothing is received unless the recipient has some power of reaction: for action implies reaction. A photographic plate responds to certain kinds of stimuli and ignores others, and responds in certain definite ways; so does the blank sheet of paper on which we write; otherwise no impression would be made.

Much more than may we expect a living organism to exercise a selective power and a capacity for reaching in certain definite ways. The biological, as well as the purely psychological considerations, are dead against the notion that the mind can be looked on as a kind of box into which ideas can be packed, and found again when wanted.

¹ Spencer, "Princ. Psych.," i. 467.

CHAPTER IV.

ATTENTION.

§ 1. Attention and its Effects.

WE have seen that there are degrees of consciousness, and that we find the most intense degree of consciousness in what is here called the *focus of attention*. By Attention we mean primarily the intellectual activity of the subject, by which it becomes conscious of presentations, and secondarily, the heightened consciousness itself, which is the effect of this activity. It is not a peculiar kind of mental activity, marked off from other kinds, but simply mental activity in general of a relatively intense kind. Directly we are fully conscious, we find that our mental gaze, whether directed on what we call external objects, or on ideas of our own, has been fixed, and also limited in extent; that the presentations to which we are attending have become intenser and clearer; and further, if the process be at all prolonged, we are aware of a certain amount of what we call mental tension or strain.

The entry of a presentation into the full focus of attention, so that it is perceived with maximum clearness, is called by Wundt *apperception*.¹

¹ Other writers use the word very differently.

(1) Attention arrests the natural tendency to change in the contents of consciousness. The normal condition is one of "poly-ideism;" consciousness is distributed over a number of different presentations, and these are constantly changing. When we attend, this gives place to a condition of temporary "mono-ideism." For a brief interval the mind is occupied by one idea, and the diverging trains of associated ideas are disregarded. This state of fixation and concentration is maintained with difficulty; and thus Professor Ribot is led to speak of the "radical antagonism between Attention and the normal psychical life."

However, this fixation is only relative, since, as we have seen, change in its contents is a necessary condition of the continuance of consciousness. What really takes place, as Sully says, is a series of small oscillations of attention about a central point; in examining a small object attentively, the outline, colour, shading, weight, material, etc., each claiming full attention in rapid alternation for a brief instant. Absolutely speaking, there is constant change, and yet relatively to other objects, that to which we attend persists in consciousness. We must, therefore, not say that Attention always causes us to detain a single presentation or sensation; for when Attention is fixed on a complex object of thought, or even perception, many separate presentations successively occupy us. "Each new thought and its distinction depends," as Stout says "on sensory differences. These sensory differences, as such, are detained in the field of at-

tentive consciousness only so long as they are useful.”¹

(2) When we attend to a sensation or a simple percept, it becomes more *intense*. This is generally recognized. In battle the soldier not uncommonly overlooks a wound which is not severe enough to disable him; while, on the other hand, the morbidly exaggerated attention of an invalid may magnify a small discomfort into an agony.

With the increase of intensity, and perhaps partly in consequence of it, goes greater *definiteness* in the percept. The tea-taster, or wine-taster, by concentrating his attention, recognizes flavours which are too slight and indefinite to be clearly discriminated by ordinary persons. The musician hears the component parts of chords and the overtones which accompany the fundamental tone when a note is struck. The artist sees colours where others do not. “Every artist knows how he can make a scene before his eyes appear warmer or colder in colour, according to the way he sets his attention. If for warm, he soon begins to *see* the red colour start out of everything; if for cold, the blue. Similarly in listening for certain notes of a chord, or overtones in a musical sound, the one we attend to sounds probably a little more loud as well as emphatic than it did before.”²

Of course the degree of intensification is not limitless. “A sensory presentation may be in-

¹ “Analytic Psychology,” i. 249.

² James, “Principles of Psychology,” i. 425.

tensified through attention, but only up to the point where it reaches that degree of intensity which would have been produced by the stimulus, if it had not been counteracted by certain collateral influences in the nervous system.”¹

This greater definiteness, as Stout points out, is partly due to the adjustments of the sense organs, brought about by attention. “When, for instance, by a movement of the eyes a stimulation passes from a lateral portion of the retina to the *fovea centralis*, a more differentiated sensation is the result, because the surface affected is more sensitive to differences.”²

There is, of course, the difficulty that we cannot from the nature of the case directly compare the intensity of a given sensation before, and after, it has become the object of attention. And it is only fair to say that the increase in intensity has been denied by Fechner, and by more recent psychologists, e.g., by Münsterberg. Indeed, the last claims that his experiments show that sensations on which attention is fixed, actually appear *feebler*. While some further research is rendered necessary, there appears to be no great likelihood of the received opinions being reversed. Wundt, however, now regards the increase of intensity of a sensation as a secondary effect of attention, produced not directly, but in consequence of the phenomena

¹ Stumpf, quoted by Stout, “Analytic Psychology,” i. 250. There seems no reason why the only “collateral influences” mentioned should be physiological.

² “Analytic Psychology,” i. 245.

which accompany attention. On the other hand, N. Lange, an able living Russian psychologist, holds that the primary effect consists in the increase of intensity, and that the increase of distinctness is due to this.¹

(3) With increase of intensity and definiteness goes limitation of the area of consciousness. Just as the rays of light which the lens concentrates on a single spot are diverted from other points, on which they would otherwise have fallen; so here, attention implies a certain degree of inhibition of consciousness. It has a negative side as well as a positive. Sir W. Hamilton held that the intensity of our consciousness varies inversely with its extension. This principle, which he calls the Law of Limitation, is roughly true. But we must remember that the intensity of the bright spot on the paper in the cavern will vary with the brightness of the candle, as well as according to the degree of concentration; and in the same way we know that the degree of disposable consciousness does not always remain the same at all times and under all circumstances. Waning consciousness of what we fix our minds on, may be due to diminished activity, as well as to less efficient concentration. When fully concentrated, attention may, perhaps, be fixed on only one presentation at once; but the unity of object is very momentary. The need for change is not overcome. Sir W. Hamilton says, "So far from consciousness not being competent

¹ *L'Année Psychologique*, 1895, p. 381.

to the cognizance of two things at once, it is only possible under that cognizance as its condition. For without discrimination there can be no consciousness; and discrimination necessarily supposes two terms to be discriminated." This is true; but it overlooks the fact that the two need not be in the full focus of attention at the same instant. One may be in the field just outside the focus. As already said, in attention we get rapid oscillation rather than absolute concentration and fixation.

The question is often asked, How many objects can the mind embrace at once? The greater the number of presentations, the fainter tends to be the consciousness of each; but it seems possible to attend to five or six, or even seven, distinct objects at once, e.g., dots on a sheet of paper, not, of course, with full consciousness, but without confusion. Wundt's experiments go to show that the maximum is six. When the objects are somewhat more complex, from three to five can be apperceived at once. Probably, however, only one object can be in the absolute focus of attention at once. The others are in the peripheral field of attention. If two or more objects are kept at the focus of attention at the same instant, it is almost certainly because the mind has so united them that they form one mental object. Dr. James goes further, and says, "The number of things we may attend to is altogether indefinite, depending on the power of the individual intellect, on the form of the apprehension, and on what the things are. . . But however numerous the things,

they can only be known in a single phase of consciousness, for which they form one complex 'object;' so that, properly speaking, there is before the mind at no time a plurality of *ideas* properly so called."¹

§ 2. Further Effects of Attention: Pre-adjustment.

Up to the present we have seen that Attention is accompanied by

- (1) Fixation, or persistence of the presentation.
- (2) Greater intensity and distinctness of the presentation.
- (3) Less extent of the presentation.

In addition to these we must notice that its effects include:

(4) Greater probability of reproduction. Every teacher knows that what the pupil does not attend to he ordinarily does not remember.

(5) A shortening of the reaction time. One of the problems which have most attracted psychophysical investigators has been the determination of the time occupied by mental processes, or rather by the physiological processes which are their causes or accompaniments.

¹ James, "Principles of Psychology," i. 405, Cf. i. 276: "However complex the object may be, the thought of it is one undivided state of consciousness."

² See James, "Principles of Psychology," i. 86 sq.; 427 sq.; Ladd, "Elements of Physiological Psychology," 470 sq.

It is found that the interval called the *reaction-time*, between the reception of a stimulus and a muscular reaction—e.g., touching an electric button, or moving a lever—varies in consequence of the pre-adjustment of attention. Thus in a particular series of experiments Wundt found that when a warning had been given that a certain sound was to be made, and when the attention was in consequence fully adjusted in expectation of it, the reaction-time occupied on the average 0·076 of a second, as against 0·253 of a second when no warning had been given. After many experiments the reaction-time still further diminishes, until so perfect is the adaptation that the motor reaction takes place absolutely at the same time as the stimulus itself takes place. On the other hand, when any conditions are introduced to render complete attention difficult, the reaction-time is lengthened. The perception of the stimulus and the registration of it by a movement take longer when the stimulus is unexpectedly loud, or unexpectedly weak, or is accompanied by other sensations which tend to divert attention. The average retardation was found by Wundt, after a long series of experiments, to be from ·045 to ·171 of a second, according to the nature of the obstacles presented to the activity of attention.¹

¹ See § 5 below.

§ 3. The Sensation of Strain.

Intense attention is always accompanied by a special sensation of strain. In the case of external perception we refer this sensation to the organ itself; everybody knows the peculiar tension felt in the eye or ear when we are trying to catch a distant sight or a faint sound. The tongue, nose, and skin seem to give us the same kind of sensation in a less marked degree. In the case of thought or memory, when we seek, for instance, to recall some half-forgotten name, the strain seems to be located in the head.

Wundt showed that motor innervation of the muscles occurs not only in actual movement, but also in attention. In both cases, a nervous current flowing to the brain from the sensory organs (afferent current) may act as a stimulus, and a reaction takes place in the form of an efferent current directed to the same part. If this outward-bound current diffuses itself mainly over the local muscles, and only slightly over the sensory apparatus, we get consciously controlled movement. If, on the other hand, it diffuses itself mainly over the organs of sensation, and only in a minor degree over the muscles, we get, first, increased activity of the sensory organs, and hence increased intensity of the sensation; and, secondly, a tension of the muscles, a tendency to contraction. The first physiological fact accounts for the clearer and intenser form of the sensation; and the second for the peculiar accompanying sensation of

strain. The two associated sensations (in accordance with a well-recognized psychological law), reinforce each other; so intimate is their connection, that by merely attending to a part of the body, we can sometimes produce sensations there. Even when there is no actual external stimulus, but only imagined sensation, we still get a stimulus sufficient to produce innervation of the muscles of the organs of sense. Thus, when we picture an object clearly to the mind, the eyes often become set, as if we really beheld the object. This must be because visual imagination involves some kind of process in the organs of sight, analogous to, and in the same nerve-tract as, the process which takes place when we actually see.

Some psychologists treat Attention as consisting essentially in these sensations of movement, which we have described as the *consequence* of attention. This seems to be a serious error. "Sensory accommodation [the process which gives rise to them], is not sensory attention, but only a means of sustaining and promoting it."¹

§ 4. Kinds of Attention.

An important distinction is made between (1) Automatic, and (2) Voluntary Attention. In the former, there is no exertion of Will; the mind is not conscious of being solicited by competing objects of interest. In

¹ Stout, "Analytic Psychology," i. 210.

the latter, the attention is only kept fixed on a given object by conscious withdrawal of it from other objects. The attraction of these other presentations which are in the field of consciousness, is only neutralized by the desire to keep the mind fixed, a desire which comes from previous reflection and resolution.

An exertion of will is necessary. The schoolboy wants to think about cricket or silk-worms instead of his book, but his desire to win a prize or avoid a scolding, supplies an artificial attractiveness to the pages of his Latin grammar. This artificially induced interest becomes associated with the natural interest, strengthens and fosters it. The Latin grammar may become, after a while, so interesting in itself, that the attention, at first voluntary, may become automatic.

“There is no such thing,” says James,¹ “as voluntary attention sustained for more than a few seconds at a time. What is called sustained voluntary attention is a repetition of successive efforts which bring back the topic to the mind. The topic once brought back, if a congenial one, develops; and if its development is interesting, it engages the attention passively for a time.”

Between purely automatic or reflex attention, and purely voluntary attention, a third type has sometimes been distinguished. Thus, Sir W. Hamilton remarks three successive degrees: viz. (1) “Vital and irresistible,” or automatic attention, (2) Attention de-

¹ “Principles of Psychology,” i. 419-420.

terminated by desire, which is in the strict sense of the term involuntary, but may be resisted by the will, and (3) Attention determined by deliberate volition. And a recent writer, N. Lange, distinguishes (1) Reflex attention, mechanically produced, (2) Instinctive attention, differing from the former in the presence of the emotional factor of curiosity, (3) Voluntary attention.¹

Another important distinction is made between attention directed to (1) external objects, and to (2) the train of ideas. The former is, of course, much easier, and appears much earlier in life than the latter. Recent investigation has shown that these two kinds of Attention do not affect the respiration or the circulation in exactly the same way.²

§ 5. Conditions of Attention.

The conditions of voluntary attention are to a large extent the same as those of automatic. The latter may be divided into two groups :

- (I.) Those principally belonging to the presentations *quâ* presentations.
- (II.) Those principally belonging to the subject, that is, to the knowing mind.

(I.) To begin with the former. The chief objective

¹ Cf., Hamilton, "Lect. Metaph.," i. 247, *sq.*; "L'Année Psychologique," 1894, p. 376.

² See "L'Année Psychologique," 1895 (2nd year), pp. 146 *sq.*

conditions we have to notice are Intensity, Duration, Repetition, Novelty, and Absence of rival presentations.

(1) *Intensity*. Other things equal, the greater the stimulus, the more imperative the demand for our attention. Other things equal, a gun fired off near us is more likely to attract us than the snapping of a stick. At the same time, a comparatively small increase of stimulation does not seem to be of much importance.

(2) *Duration*. If an object be presented to the mind for a very brief time, it may quite fail to be apperceived. The shorter the duration of perception, the more limited is the area of the focus of attention; and the longer the duration (within somewhat narrow limits), the larger the area of this focus.

(3) *Repetition*. This serves instead of duration. A picture exhibited in a dark room by a series of weak electric sparks, is at length seen quite clearly by the illumination of each single spark.

(4) *Novelty*. A new object of perception, has, however, generally speaking, a greater stimulating effect than a familiar one. There are, however, some important facts to be noticed in this connection. The emotional effect produced by a very strange phenomenon or odd idea often distracts attention. Again, novelty to a certain extent precludes anticipatory pre-adjustment, which is a very important condition of effective attention. And, connected perhaps with this, novelty may be so great that it has no stimulating

effect on us; what is quite disconnected with the subjects which interest us, will fail to rouse us. Thus a country yokel will be absolutely bored by the curios in the cabinet of an antiquary.

(5) *Absence of Rivalry.* Where there is rivalry of impression, consciousness cannot be so easily concentrated. This is, of course, so familiar a fact, that our first care, when we intend to work earnestly, is to take precautions against such interruptions. It is a consequence of the principle of Limitation, already mentioned.

(II.) Factors belonging to the subject himself.

(1) *The Amount of disposable Consciousness.* When we are tired and sleepy, the most stimulating objects pass unregarded. Dr. W. B. Carpenter relates how, during an action, a commander, overcome with fatigue and excitement, fell asleep for two hours, on the deck of his frigate, within a yard of one of his largest guns.

(2) *Special Interest.* Those ideas, says Locke, "make the deepest and most lasting impression . . . which are accompanied with pleasure or pain." Everything that attracts our attention does so in virtue of the fact that it has a certain interest for us. There must be some *feeling* aroused, whether simple (such as a gush of bodily pleasure), or complex (such as a sense of duty). We only attend to what interests us, and therefore only perceive and understand what interests us. In this fact, on which principally depends our

responsibility for our beliefs, we see another instance of the constant implication of feeling and thought.

Other things equal, objects of consciousness which are most in harmony with our habitual mode of feeling, or with the general emotional tone prevailing at a given time, will arouse the fullest attention and will maintain it longest and most easily. The soldier going into battle will more easily attend to his comrades than to the chaplain; the savant will more readily be caught by the announcement of a new scientific discovery than that by of a new fashion in dress.¹

(3) *Anticipatory Preadjustment.* Ordinarily the presentation precedes and calls out the necessary adjustment; but sometimes the mind is adjusted beforehand, either automatically or voluntarily. Images likely to interfere with the expected presentation are banished; and images likely to be involved in the percept are brought to the threshold of consciousness. Something has already been said on this subject in connection with the question of reaction-time. When we suddenly hear a low moan while lying awake in the night, or when in descending a staircase we find ourselves unexpectedly at the bottom, in such cases attention takes longer in coming to its full intensity, than when we have been able to prepare ourselves beforehand. For the accommodation to be complete, attention must be

¹ We may note that Mr. Stout denies that "attention *depends* on feeling (pleasure-pain). Interest as felt at the moment is nothing but attention itself considered in its hedonic aspect."—*Analytic Psychology*, i. 224 sq.

adjusted in regard to the quality, the intensity and the time of the stimulus. If we know beforehand the kind of sensation we shall experience, its degree of strength, and the exact moment of its occurrence, we apperceive it instantly. The shock of surprise is therefore less painful. Further, our apperception is fuller and richer than it would otherwise be; more of the phenomenon comes into the focus of attention. In other words, when there is pre-adjustment of attention the presentation is perceived more rapidly, more distinctly, more completely, and with less emotional disturbance than when there is no pre-adjustment.

Sometimes, indeed, illusion arises from preadjustment. Thus, the actual order of events is sometimes inverted in perception, and the sequence A B appears in the order B A. Fechner tells us that the patient who is let blood sometimes sees the blood flow before the lancet enters the skin. The explanation of which appears to be that the patient's interest is fixed mainly on the appearance of the blood, and the anticipatory adjustment for this percept is accordingly perfect; while he is not so interested in, nor so capable of foreseeing, the movement of the lancet. Hence, while the latter requires an appreciable time for its perception, the former enters into the focus of attention the moment that it is perceived. By an extension of this principle, the impression is apparently perceived before it actually occurs. The mind is taken up in preparation for the event, and the very slightest stimulation is at once interpreted as the occurrence of

the event. Thus, when on a platform awaiting the departure of a train at rest there, we may easily fall into the illusion of supposing that it has already begun to move.¹

¹ On Voluntary Attention, see below, chap. xii, § 6.

CHAPTER V.

SENSATION.

§ 1. The Complexity of Perception.

By Perception we ordinarily mean the mental process which gives us presentations of objects in space. The term is sometimes extended to cover what is called internal perception, or introspection, but this use had better be avoided.

At first sight Perception appears to be a simple process. "The getting of an idea" of an external object, such as a tree or a house, seemed to the earlier psychologists as direct and uncomplicated a process as any that we are aware of in our minds. Even Locke, who was one of the first to begin to analyze it, describes it as the "first and simplest idea we have by reflection" (*i.e.*, by introspection), and considers that it is almost purely a receptive operation, in that "the mind is, for the most part, purely passive."

Introspection, however, aided by experiment, shews that Perception is in reality an extremely complex operation. It is no doubt one of the earliest mental operations in the infant. But adult perception is a great deal more developed than that of the baby.

And the fact that Perception supplies materials for Conception and Reasoning does not prove that it is a simpler operation than either of them. .

The first and obvious analysis of the percept¹ of an object is into a group of *sensations*. Even this analysis cannot be performed by an untrained mind. The child and the savage do not analyze their percepts, nor is it quite easy for even the educated, civilized adult to perform the operation, unless he has had previous psychological training.

Let him try with some simple object, say a match-box or a stick of sealing-wax, and write down the simplest elements of sensory presentation that he recognizes in his percept. Colour, temperature, resistance, weight, and some others he recognizes by sight and touch. But he will not, unless he is accustomed to draw and paint, notice that he has no direct knowledge of form through sensations of sight; that the form is known through some kind of unconscious or subconscious inference from certain visual impressions which suggest it. If he looks at the top of the match-box on the table, he sees straight lines which make not right angles, but obtuse and acute angles, with each other; and which he must so represent, if he wishes to draw a picture of a match-box. The recognition of the thing as a match-box, which seems part and parcel of a very simple operation, is in reality, as a moment's

¹ We shall as far as possible use the terms *percept* and *concept* for the concrete products of the operations *perception* and *conception*.

thought will show, something added to an already very complex mental activity.

Perception, then, is not a direct, immediate and passive intellectual phenomenon. It cannot be likened to the reception of an image on the screen of a camera, much less to the placing of a something in a box.

In all complete perception there is, besides the reception of sensations :

(1) Revival of past sensations, whether recognizable as such (what have been called "free images" or "free ideas,") or so closely interwoven with the actual present sensations as to be detected only by inference founded on experiment and observation.

(2) Localization of the source of the impression in space, and its more or less complete externalization.

(3) Grouping of the sensations in certain relations, so that we refer them to an object having qualities.

(4) Recognition of this object as one of a class, and bearing the class name.

These will be spoken of in detail, but the student must be at once cautioned that psychologists do not mean to suggest that these steps take place independently and in any fixed order. They occur so closely, too, that they appear to be one single act. Nor is it intended to suggest that we first know the sensations, and afterwards put them together and infer the presence of objects in space.

But it is true that in all perception as we know it, these elements of revived sensations, of grouping, re-

cognition, inference, are present. What are the actual mental experiences of the baby when it is first confronted with a bright light or a loud sound, we can no more hope to appreciate than we can hope to appreciate those of an oyster. Physiologically and psychologically we have received so much education that we can never put ourselves back into the attitude of the infant; although we may dimly infer his mental experiences by attempting to subtract from ours the elements which we know have been contributed by exercise.

§ 2. Sensation.

By *pure sensation* we must understand that which would remain if all that is due to intellectual reaction on the sensation is deducted. If we could divest our percepts of all implicit and explicit images or revived sensations, and of all the results of subconscious or unconscious inference, we might get down to the pure primitive sensation. But such an analysis is obviously impossible. Hence the pure sensation is, as Dr. Ward says, a psychological myth. It is an abstraction, which does not and cannot occur in any mind capable of knowing it, and about which we can, therefore, know nothing. In theory, it is like the *caput mortuum* of the old alchemists, the inert residuum left behind in the crucible. But, in point of fact, we never arrive at it; since every individual presentation in the adult is conditioned and determined by his previous experience.

By the term *sensation* as actually employed, we really mean a special kind of perception, in some respects simpler than other kinds. A sensation of heat, or of redness, is itself a perception, though not quite so complex as the perception of a matchbox. It is the recognition of a particular experience as an affection of my own body, as of a particular quality, and as more or less localized. In this recognition there is intellectual activity, of much the same type as that which is involved in external perception, and there are other elements as well, of an introspective character. When an adult is aware that he has a pricking sensation in his toe, he is performing an intellectual operation almost as complex as when he recognizes that a nail has gone wrong in his boot.

It must not however be thought that perception begins by the recognition of sensations as states of our body; for the perception of our body is a comparatively late acquisition, which the infant must be supposed to be without.

Sensations are sometimes called *feelings*; but although this usage has high authority, it is one to be avoided. The term *feeling* is better reserved, as far as possible, for the emotive element which accompanies sensation as well as perception, and other intellectual activities. (See Chapter XI. § 1). As the term sensation is commonly used, the affective (or emotive) aspect is usually included.

§ 3. Classification of Sensations.

By a sensation, then, we understand a percept of a relatively simple kind, regarded as not yet referred to an external object. We must, of course, make a clear distinction between the remote physical antecedents (*e.g.*, burning taper, ether waves); the direct physiological antecedent or concomitant (*e.g.*, way in which the retina is affected by the ether waves); and the psychical state of sensation. These have been frequently confounded together, especially the two last.

The usual classification of sensations is into Special and General. Under the former head, we include Sight, Hearing, Taste, Smell, Touch proper, and Temperature; which have a well defined bodily organ, specially differentiated to receive and transmit special kinds of stimuli. While under the latter, we place the Organic or Systemic sensations, sometimes referred to collectively as *Cænæsthesis*. The position of the group known as Muscular or Motor sensations is discussed in § 11 below.

We cannot draw a very definite line between general and special sensations, since (among other reasons) general sensation is found in the organs of special sensation. But, in the main, we may say that the data of the special senses show greater capacity for discrimination and retention, than those of the general. They are capable of being better localized; and they afford us more knowledge of the nature of things external to our body.

It will be seen, then, that while we apparently take a physiological basis for our classification of sensations, we are driven by purely psychological considerations to the same classification. The specific *quality* of the sensations of sight would lead us to class them apart, even if they arrived by means of the same organ as those of sound.

Wundt recognizes two main classes of Senses, viz., (1) those of which the sensations have only one definite quality, subject to degrees of intensity, and (2) those of which the sensations have various types of quality, each of which is susceptible of different degrees of intensity. Touch, Organic sensations, and Motor sensations belong to the former group; Sight, Hearing, Taste and Smell, to the latter.

Another division is into Mechanical and Chemical senses. To the former belong Touch and Hearing, of which the stimuli are molar movements; to the latter belong Sight, Taste and Smell, of which the stimuli are presumably molecular movements.

§ 4. Sensation as Quantitative: Weber's Law.

Psychologists recognize in Sensation difference of Quantity, (Intensity and Extensity), Quality, Complexity, Relativity, Local character, Duration and Affective Tone.

(1) *Intensity*. The measurement of the intensity of sensation has been the principal work at present

done by the experimental methods of research already alluded to; and the results obtained form the chief part of what is known as *Psychophysics*.¹

What is the relation between intensity of sensation and intensity of stimulus? If we double or treble the intensity of stimulus, shall we double or treble the intensity of the sensation? The usually accepted answer to this is called Weber's Law or sometimes Fechner's Law.² Put simply, it comes to this, that the intensity of the stimulus must increase in geometrical progression for the intensity of the sensation to increase in arithmetical progression. If the intensity of the sensation is to increase by equal amounts, the intensity of the stimulus must increase in such a way that the increment always bears the same relation to the preceding intensity. Suppose that a weight of s grains laid on the back of my hand has to have n grains added to it for me just to become aware of an increase of sensation. Now suppose a weight of $3s$ grains substituted for the former; if n grains are added, I shall not know that any addition has been made. The intensity of the sensation has not increased, although the intensity of stimulus has. The ratio $\frac{n}{s}$ is the measure of the amount by which the intensity of the stimulus must be increased; so that the stimulus $3s$

¹ See chap. i., § 4.

² Strictly speaking there is a slight difference. See, for instance, Ladd, "Outlines of Physiological Psychology," p. 365 *sq.*

must be increased by $\frac{n}{s} \times 3s$, and the stimulus $4s$ by $\frac{n}{s} \times 4s$, and so on. So that the just perceptible addition of weight is always a constant fraction of the actual weight. In the case of pressure (weight laid on the skin, sensations of strain being excluded), this fraction is about $\frac{1}{3}$. That is, whatever may be the pressure already felt, an increase of pressure will be felt, if the added pressure amounts to $\frac{1}{3}$ of the former. And so, a diminution will be felt if $\frac{1}{3}$ of the present pressure be subtracted. This fraction $\frac{1}{3}$ holds good also for temperature sensations, and for sound sensations. In the case of light, the fraction is $\frac{1}{10}$.¹

This law must not, however, be taken too absolutely. With sensations of very high or very low intensity, it is not found to hold. Nor is it always found correct, even in the case of sensations of moderate intensity. It is rather a rough approximation than an exact law, and has obtained an amount of attention disproportionate to its importance.

In the psycho-physical researches required to establish Weber's law, it was necessary to decide what is the additional intensity of stimulus required to produce the *smallest perceptible difference* of intensity for each kind of sensation; and also to decide what was the smallest intensity of stimulus required to produce the *smallest intensity of sensation perceptible*.

¹ The fractions given are those of Wundt. The results of different experimenters vary a great deal.

The following results may be noticed, with regard to the second question.

Taste. Valentin found that a solution of one part of extract of aloes in 900,000 parts of water, could be distinguished from distilled water, and he thought he could distinguish a $\frac{1}{1,000,000}$ solution of sulphate of quinine. On the other hand, much stronger solutions of sugar and salt were required; *e.g.*, a $\frac{1}{420}$ solution of salt was scarcely detectable. "In general, a smaller absolute quantity of stimulus when in a relatively concentrated solution will suffice to excite the end organs of taste."¹

Smell. It has been found, that air polluted with $\frac{1}{1,700,000}$ of its bulk of sulphuretted hydrogen can be distinguished from pure air. About $\frac{1}{2,000,000}$ of a milligramme of alcoholic extract of musk can be detected.

Temperature. It is usually said that a change in the existing bodily temperature of $\frac{1}{8}^{\circ}$ Centigrade is about the minimum. This is too general to be of any value.

The sensitiveness of different parts of the skin varies very much. High sensibility to heat, and high sensibility to cold, do not necessarily go together. Again, "the skin is most sensitive to changes near its own zero-point."

Touch. Pressure of $\cdot 002$ of a gramme (on forehead), to one gramme on finger-nails and skin of heel.

¹ Ladd, "Elements of Physiological Psychology," pp. 377-8.

Hearing. It has been reckoned that the minimum is the noise made by a cork ball of one milligramme falling from the height of a millimetre on a plate of glass, the ear being as close as possible.

Sight. Special difficulty is met with in finding the minimum stimulation perceptible in case of sight, on account of the so-called *Eigenlicht* of the eye. This varies a good deal in intensity. Aubert estimated it in his own case, as half the brightness of a sheet of white paper when seen in the full light of the planet Venus.

Muscular movement. A contraction of .004 millimetre of the internal rectus muscle of the eye.

(2) *Extensivity of Sensation.*—That sensations differ in volume was pointed out by Bain, who called some sensations, such as those of a warm bath, *massive* or *voluminous*. Ward has made the matter clearer. "Suppose a postage stamp pasted on the back of the hand; we have in consequence a certain sensation. If another be added beside it, the new experience would not be adequately described by merely saying that we have a greater quantity of sensation, for intensity involves quantity, and increased intensity is not what is meant." At the same time the two kinds of quantity are related, so that increase of one may cause increase of the other, and *vice versa*.

Extensivity is not confined to touch (including temperature sensations) and sight. Bain and Stumpf speak of the massiveness or extensivity of certain tones. The sensation of a mouthful of a solution of sulphate of

quinine is different from the sensation due to a drop of the same solution.

§ 5. Other Characteristics of Sensation.

(3) Sensations differ in regard to *Quality*. *Generic* differences of quality are those which separate the sensations due to separate organs. *Specific* differences are those which obtain between sensations of the same organ. The former are such that it is as a rule difficult to confuse them. It is almost impossible to mistake sound for light. At the same time it must be acknowledged that tastes and smells and touches may be confused with each other ; and it is not always possible to discriminate between the sound of a deep organ pipe and the sensations due to vibration of the skull (organic sensation).

(4) *Complexity* is really a special case of quality. Introspection and objective experiment show us that most of the sensations we regard as simple are really complex. For instance, in holding a weight in the outstretched hand we have sensations of contact, pressure, temperature, and muscular effort mingled together. Our colour-sensations turn out to be due to the mixture of certain primary colours. Our tone-sensations are also highly complex ; the chord which affects us as an individual whole is resolvable into separate tones, each of which is complicated by over-tones.

(5) By the *Relativity* or interdependence of sensations

we mean the fact that their quality and intensity are not absolute, but are determined, at any rate in part, by the position they hold in the series of conscious states. The same water appears hot or cold, according to the previous temperature of the hand. A cup of tea appears more or less sweet according as we are eating with it bread and butter or cake. The phenomena of colour contrast are a more striking because less familiar instance of the same thing.¹

(6) *Local character*. Psychologists attribute to some classes of sensations a special character which is not fully present in consciousness, but which must be supposed to exist in order to account for the fact of space-localization. This, the local-colouring or local-tone varies according to the part of the organ affected. Thus when my eyes are shut, I know whether you are touching my right hand or my left, the thumb or the index finger. Why? There must be some sub-conscious appreciation of a difference between the two sensations although made with the same degree of pressure and in all other respects exactly alike. This sub-quality, as it has been called, forms the *local-sign*.

(7) Of *Duration* there is no need to speak in detail.

(8) By the *Affective Tone* of a sensation is meant its emotive aspect, the pleasurable or painfulness of it. Unlike Quality, it is not always the same; for it is determined very largely by other circumstances than the nature of that particular sensation. Certain

¹ See chap. ii. § 2 above.

general truths hold good with regard to it; *e.g.* (1) When the intensity of the sensation = 0 there is no tone. (2) Moderate intensity usually gives a pleasurable tone. (3) When the intensity goes beyond a certain point the tone becomes painful. (4) Certain sensations seem in their nature more pleasurable than others, while some are unpleasant in nearly all degrees. (5) The complexity of sensation affects the tone by increasing the volume, and thus increasing the pleasure; but also brings in the possibility of conflict or discord.¹

§ 6. Organic Sensations.

The Organic Sensations are much vaguer than those of the special senses; they are difficult to discriminate, they pass into one another, and are not often clearly localizable in space and time. Unless they have a painful tone we pay little or no attention to them, under ordinary circumstances. Hunger, for instance, begins unobtrusively, and does not associate itself definitely and closely with any other sensation. On the other hand, the special sensations especially the higher ones (Sight, Hearing, etc.), are clearly limited and defined, and readily cohere with each other; and they are easily referred to exact positions in space and time. Our knowledge of space is due to the association of visual, muscular

¹ See below, chap. xi. § 2.

and tactual sensations; our formation of words and sentences is only possible by reason of the firm cohesion of separate sensations of sound. We never *project* organic sensations, that is, refer their origin to a place outside our body, as we do most of the sensations of sight, touch, etc. The revivability of the organic sensations is very slight. It is extremely difficult to realize hunger, when we are not hungry; or to imagine ease from pain when we are suffering from gout or rheumatism. On the other hand, sights, sounds, etc., are all more or less recoverable.

The organic sensations are, however, of supreme importance in relation to pleasure and pain. In the treatment of the special senses below, the organic sensations associated with some of the special senses are enumerated apart, and it is noticeable how large a proportion of the pleasure or pain we connect with the ideas of Taste, Smell, and Touch, is due to these elements. The systemic sensations are the main factor in the general feeling of comfort or discomfort which forms at any given time a sort of background to our psychical life.

A clear notion of the difference between organic sensation and the special sensations can be got by placing the edge of a sharp knife on the skin. Here we have a sensation of Touch in which the intellectual side predominates; we refer the feeling to the object which causes it, and thus readily pass from sensation to perception. If, however, we cut the skin, the intellectual element almost disappears, a state of

consciousness ensues mainly characterized by the presence of pain, and we no longer refer the feeling to an external object but regard it as eminently a change in us; we pass from the objective to the subjective point of view.

Professor Bain gives the following classification of the organic sensations:

(1) Organic Sensations of Muscle, Bones, etc.: *e.g.*, those caused by wounds, cramp, fatigue, etc.

(2) Organic Sensations of Nervous tissue: *e.g.*, neuralgia.

(3) Feelings connected with Circulation and Nutrition, *e.g.*, thirst, starvation (*not* hunger).

(4) Feelings of the Respiratory organs, *e.g.*, suffocation.

(5) Feelings of Heat and Cold, connected chiefly though not exclusively with the Skin.

(6) Organic Sensations of the Alimentary Canal—(not to be confounded with Taste proper)—*e.g.*, relish, hunger, nausea, dyspepsia.

(7) Feelings connected with the Sexual Organs, mammary and lachrymal glands, etc.

It is best, however, not to regard (5) as organic sensations, though they are very closely allied to them.

§ 7. Taste and Smell.

These sensations come nearest to the organic sensations.

TASTE.

External Causes.—Liquids and soluble substances. But tastes can be induced by electrical stimulation, and perhaps by mechanical pressure.

Organ.—Mucous membrane of the tongue. It is at present doubtful whether the under surface of the tongue and the soft palate and fauces, have taste. The papillæ on the upper surface of the tongue are supposed to be the chief agents; they vary in size and form from the tip to the rear of the tongue (filiform, fungiform, etc.). They are supplied with filaments from the trigeminal and glosso-pharyngeal nerves; of which the latter seem to be of primary importance.

Mode of Action.—Probably chemical.

Prof. Bain distinguishes :

(i) *Organic Sensations connected with Taste, viz.,* those of the Alimentary Canal.—Relishes and their opposites.

(ii) *Taste Proper.*—Sweet and bitter.

(iii) *Taste combined with Touch.*—Acid, astringent, and fiery tastes. The nerves of touch (trigeminal) appear to be affected as well as those of taste (glosso-pharyngeal).

To these we may add.

(iv) *Taste combined with Smell.*

We can recognize by taste, says Bernstein, a solution of 1 part of sulphuric acid in 1000 parts of water. One drop of this solution, sufficient for discrimination

by the tongue, will contain about $\frac{1}{488}$ of a grain of the acid. Other estimates have been given. Valentin's (solution of 1 part of extract of aloes in 900,000 of water, etc.), has already been referred to.

Psychologists usually recognize four principal types of gustatory sensations, viz., sweet, bitter, sour, salt. Some, like Bain, try to reduce these to two, sweet and bitter; while others add alkaline and metallic to the four above mentioned.

SMELL.

External Causes.—Gaseous and volatile bodies. Mechanical stimulation may produce it; and perhaps electrical.

Organ.—The lining membrane of the nose; this is disposed also over the surface of the turbinal (spongy) bones, thus giving a greatly increased area. This membrane is supplied by a special pair of nerves, the first of the cerebral nerves.

Mode of Action.—Probably chemical.

Professor Bain distinguishes the following Sensations:

(i) *Organic Sensations connected with Smell*, viz., those of the lungs and other parts of the respiratory organs. To them we must add those Organic Sensations of the stomach, which are excited by nauseous and appetizing smells.

(ii) *Smell Proper.*—Fragrant odours and stinks.

(iii) *Smell combined with Touch.*—This element of Touch we get in pungent odours; it appears to be due

not to the olfactory nerve but to the nerves of touch supplied to the nose (trigeminal).

A gaseous form seems to be necessary in order to affect the sense of Smell, although the action, as stated above, is probably chemical, since the smell varies with the chemical composition. "Those gases are odorous which have a great tendency to combine and to react rapidly upon organic tissues. Those gases on the contrary which are not odorous have no chemical action upon organic tissue, or only a very slow one." To the former class belong chlorine, sulphuretted hydrogen, and the vapours of alcohol and ether; to the latter, nitrogen, hydrogen and carbonic acid. A current of air is necessary to the maintenance of the sensation; if we hold our breath the sensation ceases.

A noticeable characteristic of Smell is its extreme delicacy. "Valentin has calculated that we are able to perceive about the $\frac{1}{100,000,000}$ of a grain of musk. The delicacy of our sense of Smell thus far surpasses that of the other senses. . . . Even spectrum analysis, which can recognise $\frac{1}{1,000,000}$ of a grain, is far surpassed in delicacy by our organ of Smell" (Bernstein).

Another experimentalist (Dr. Fischer) has shown that $\frac{1}{300,000,000,000}$ of a grain of mercaptan can be detected. Others results have been given on page 82.

§ 8. Touch.

External Cause.—Solids and liquids in actual contact with the skin ; gases only when in movement. In the case of Temperature sensations, any bodies in a state of molecular motion.

Organ.—The skin, and some parts of the mucous membrane, and the subjacent tissues. Where the sense is most acute we find papillæ, which are less deeply covered by the outer layer of the skin. The nerves of touch terminate in free *fibrille*, or in *tactile corpuscles* (corpuscles of Pacini, corpuscles of Krause, corpuscles of Meissner, etc). There is very considerable reason for thinking that the fibres by which the different types of tactile sensation are transmitted, are distinct and specific. Thus modern writers recognize “heat spots,” “cold spots,” “pressure spots,” and even “pain spots,” unequally distributed on the surface of the skin, and supplied (in all probability) by separate nerve fibrils.

Mode of Action.—Usually by contact ; but not always. Heat, for instance, affects us ordinarily by direct radiation.

We may distinguish (according to recent teaching) the following types of sensation as coming under the head of Touch.

(i) Sensations of Touch proper (recently termed Haptic sensations from Greek *ἅπτω*) include those of *Contact* and *Pressure*. It is doubtful how far these two are really distinct ; it seems to be a question of

degree. Griffing has recently shown that sensations of Impact (or shock) perhaps deserve a subdivision to themselves.

(ii) Sensations of Temperature. *Heat* and *Cold* must not be regarded as different degrees of the same mode of sensation. Experiment appears to prove that they are essentially different, although their physical causes are continuous.

(iii) Touch combined with Organic Sensations—such are Tickling, Itching, Thrilling, and Tactile Pain. (By Pain here is meant an organic sensation having a definite cognitive quality, but chiefly interesting on account of its emotive aspect.)

(iv) Touch combined with motor sensations. Such are the sensations accompanying the movement of a finger over the surface of a table.

(i) *Touch proper*.—

The German physiologist, Weber, first ascertained by experiment that the skin is not equally discriminative in all parts of the body. Contacts, made by the ends of a pair of compasses, coalesce and are perceived as a single sensation when the distance between them is

Less than 5	or 6 centimetres (1·97 to 2·36 inches)	on the back.
„	3 or 4 centimetres (1·18 to 1·58 inch)	on forearm (lengthwise).
„	4 or 5 millimetres (·157 to ·196 inch)	on back of hand.
„	2 millimetres (·079 inch)	on tip of finger.
„	1 millimetre (·039 inch)	on tip of tongue.

The spaces within which two points are not discriminated as double are called "sensory circles," though they are not exactly round. Indeed, on the limbs they are oval, the longest axis being in the direction of the limb's length; that is, the sense of locality is greater in a transverse than in a longitudinal direction. The size of the sensory circle at any given place on the skin varies in different persons, and even for the same person at different times. Practice diminishes the distance which must intervene between the two points, and accordingly we find that the sensory circles of blind persons are smaller than those of normal people. Volkmann found that practice with one member (*e.g.* a finger of the left hand) reduced the sensation circles on the right finger corresponding, as well as on itself. Quite recently Griesbach has shown that the discrimination of points varies a good deal with fatigue.

Goldscheider claims to have proved the existence of "pressure spots." He holds that a fine point touching the skin while it produces in some places simply an indefinite sensation of the organic type, produces in other places (which he calls "pressure spots") the sensation of pressure or contact. The sensation of pressure cannot be produced by pressure of the point on the intermediate places. When the pressure of the point is increased it gives rise to painful organic sensations, but not to sensation of pressure.¹

¹ Ladd, "Outlines of Physiological Psychology," p. 346, *sq.*

(ii) *Temperature.*—

The degree of sensibility depends to some extent on the thinness of the skin ; yet not entirely, since we can drink with impunity hot liquids in which we could not bear our fingers. Another well known fact is that we can bear the immersion of a small part of our body in water which is too hot for us to retain a whole limb in. The area of skin which is touched has a noticeable effect on the intensity and even on the special quality of the sensation. Certain smooth objects in contact with the skin (some of them bad conductors, *e.g.* paper, porcelain,) appear colder to the hand than similar surfaces of rougher materials.

Blix, Goldscheider and Kiesow, have abundantly proved the existence in the skin of “heat spots” and “cold spots” which are not sensitive to pain and apparently not to pressure. The “heat spots” are apparently insensitive to cold ; and, broadly speaking, the “cold spots” are usually insensitive to heat.

The skin, then, must not be regarded as an extremely simple organ. Anatomically speaking, the whole surface is in the highest degree diversified. As Ward says, “Scarcely two portions of the sensitive surface of the human body are anatomically alike.” A contact of any appreciable extent touches many fibres of many nerves, and these have not all the same rôle to perform. Pressure spots, temperature spots of two kinds, pain spots, are scattered about in different proportions. Local discrimination varies constantly. The sensations originating in each portion of the skin have their own

local sign. Hence, if a piece of skin be raised from the forehead, and bent over on the nose, and grow there, the irritation of this transposed strip is at first referred to the forehead, and not to the nose. This difference of the "local colouring" of sensations of touch, makes what has been called the *extensity* of touch-sensations possible.¹ Two stamps, stuck on the skin side by side, are felt as causing *more* sensation than one stamp; not greater intensity of sensation, but a greater totality of sensation, the parts of which could exist independently and are presented together as distinguishable and yet combined.

Mr. Spencer holds that the other more complex senses arose by degrees out of the general irritability of nervous tissue, or, in other words, from the *undeveloped* sense of Touch. "The saying of Democritus that all the senses are modifications of Touch, modern science goes far to confirm. Smelling obviously implies the *contact* of dispersed particles with a specially modified part of the organism. . . . Hearing results when we feel the vibrations of the air lying in *contact* with our bodies. As the skin at large is sensitive to a succession of mechanical impulses given by dense matter, so certain external auditory structures, easily moved, are sensitive to a far more rapid succession of mechanical impulses given by matter of greater tenuity. The organ of sight, again, is one through which the pulses or undulations of a yet more delicate medium

¹ See above, p. 83.

are impressed on us. . . . So that in every case the sensation produced in us by something in the environment involves mechanical action on some part of our periphery. In every case, therefore, touch, of a coarse or refined order, is implied. . . . The organs of the special senses are every one of them developed from the dermal system—are modifications of that same tissue in which the tactual sense in general is seated.”¹

But it must be remembered that “Touch, *as we experience it now*, is probably quite as complex as any of our special sensations.” (Ward.) It is more probable, continues Dr. Ward, “that the sensations answering to the five senses in their earliest form were only slightly different variations of the more or less massive organic sensation which constituted the primitive presentation-continuum.”²

§ 9. Hearing.

External Cause. Bodies in a state of (molar) vibration.

Organ.—The Ear is divisible into the external ear, the tympanic cavity, and the internal ear. The exact part played by the *concha* or external organ is not ascertained; it is certainly not necessary to the sensation. The *membranam tympani*, a loosely stretched curtain, when thrown into vibration by the waves of

¹ Spencer, “Princ. Psych.” i. 304-5. Cf. Hamilton, “Lect. Metaph.,” ii. 152-3.

² Article “Psychology,” p. 50.

air, communicates these vibrations by means of a chain of small bones (*malleus*, *incus*, and *stapes*) to the membrane which covers the *fenestra ovalis*. The labyrinth of the inner ear embraces two curious formations, the semi-circular canals, and the cochlea, which meet in a central cavity, the vestibule, into which opens the *fenestra ovalis* and another aperture (called the *fenestra rotunda*), also covered with a membrane. The walls of the bony labyrinth are lined throughout with a membrane (the membranous labyrinth), and filled with fluid. The semi-circular canals are situated in three planes at right angles to each other, two vertical and one horizontal; the membranous labyrinth is here covered with fine hairs connected with nerve fibres, and furnished with calcareous granules called otoliths. The membranous lining of the cochlea is furnished with a series of fibres (the fibres of Corti) placed like bows, numbering about 3,000. It is highly probable, though not certain, that each of these fibres is supplied by at least one filament of the auditory nerve. They are of extreme minuteness.

Mode of Action.—When the vibrations of the tympanic membrane have been communicated to that of the *fenestra ovalis*, the fluid of the labyrinth is thrown into vibration, and consequently also the minute hairs of the semi-circular canals, and the fibres of Corti in the cochlea. These in their turn affect the filaments of the auditory nerves (the eighth pair, sometimes termed the *portio mollis* of the seventh pair).

It is sometimes held, with some probability, that the perception of noises is mainly due to the action of the

otoliths, which help to irregularly irritate the nerves in the labyrinth, having been themselves thrown into irregular movements by the vibration of the labyrinthine fluid. The intensity and direction of sounds, whether musical or otherwise, are probably discriminated through the assistance of the membranous labyrinth. On the other hand, the cochlea is concerned in the discrimination of the pitch of sounds, for the fibres of Corti appear to be to the sense of Hearing what the retina is to Sight. They have been likened to the keys of a piano, each fibre corresponding to a note. When a tone is produced, the corresponding fibre is agitated.¹

It is only fair, however, to say that recent experiments, recorded by Wundt, go to show that the auditory nerve (at any rate in pigeons), is capable of being *directly* excited by sound-waves, after the labyrinth has been entirely removed.

We must carefully guard against confusing the external cause of sounds, the vibrations of bodies and of the atmosphere, with the mental states which these severally produce through the stimulation of the organ of hearing. To analyze the cause is not to analyze the sensation; although the one analysis may give a hint which may lead to the other.

Sounds are of two kinds, musical tones and noises. The former are due to periodic or regularly recurrent vibrations; the latter to non-periodic, or irregular vibrations. Even in the case of noises, a real tone, or

¹ Recent writers seem inclined to regard the basilar membrane (just beneath the fibres of Corti) as the analyzing organ.

tones, may be usually perceived by an educated ear; low tones in grating heavy noises, and high tones in creaking and hissing noises. And if many musically unrelated tones are produced together, the result is noise, as when some one sits on the keys of a piano.

Tones, then, are simpler than noises. They differ in respect to intensity and quality (pitch and timbre). Their intensity depends on the amplitude of the vibrations which produce them; their quality mainly on the rapidity and complication of the vibrations.

A simple tone is one produced by a single set of periodic vibrations of a given rapidity. A complex tone is produced by two or more such series. The *limits of pitch* vary with the individual. Thus Helmholtz found that the lower limit for himself was about 28 to 32 vibrations per second; while Preyer could hear a tone when the vibrations were only 16 per second. The higher limit varies still more; different authorities have ascertained that while many of those on whom they experimented could not hear a tone when the rate of vibration was more than 20,000 per second, others went to 40,000 and even 50,000 per second. Later research has shown that the scale varies with age, and that, while the entire scale is from childhood about 11 octaves, this is steadily reduced until it only amounts to 10 octaves.

The *smallest perceptible difference of pitch* in the same way varies with the individual, and it also varies from the different octaves of the scale. A good many persons are insensitive to differences of a whole tone; occasion-

ally, persons are insensible to differences of less than two tones ~~that is a~~ musical third. Persons with a good ear ~~can~~ ~~discriminate~~ ~~more than two~~ hundred ~~in~~ the middle octave of the piano. In the highest and lowest octaves the discrimination of even the best ear is much less fine. It must be remembered that other sensations come to the help of the purely auditory sensations in enabling the ear to discriminate pitch. Very important are those motor sensations which accompany the movements of the larynx, and other parts of the vocal organs. "We ordinarily innervate these organs (at least in an inchoate and partial way)—that is, we sound the note to ourselves—when trying to judge of its pitch. But the niceness of these muscular sensations is not great enough, even when most highly trained, to account for the discriminations of the 'good ear.' The trained musician can detect by ear a difference in quality between two tones of 400 and $400\frac{1}{3}$ vibrations per second; but the most skilful singer scarcely succeeds in singing in quarter tones." (Ladd.)

The tones produced by the voice or by musical instruments are never quite simple. They all contain harmonics, or overtones, and these give a special quality (timbre) to the sensation. A well-trained ear can detect some of the harmonics; to discover others, a special apparatus has to be employed. A complex tone is called by the German psychologists a *Klang*. The special quality or *timbre* which enables us to distinguish the tone of the violin, the flute, and the human voice,

even when they are all sounding the same note, depends on the pitch, number and intensity of the simple tones which compose the Klang.

Motor Sensations accompanying auditory sensations are of the greatest assistance not only in recognizing the pitch of tones, but also the distance and direction of the origin of sounds and rhythm.

§ 10. Sight.

External Cause.—Molecular vibrations of sufficient intensity in material bodies, communicated to the eye by vibrations of the ether. Most material substances are either self-luminous, or are capable of reflecting light waves, emitted by self-luminous bodies.

Organ.—The Eye consists of an arrangement of lenses which bring the rays to a focus on a sensitive surface—the *retina*. The outer coat (*sclerotic*) becomes transparent in front, and is there called the *cornea*. Behind the cornea lie the aqueous humour, the crystalline lens, and the vitreous humour. The crystalline lens (double convex) is capable of change of shape, becoming more convex by the action of the automatic ciliary muscle. The *iris* serves to cut off the marginal rays, and thus helps to secure a clear image. The eye is lined internally by the dark *choroid* membrane. The retina itself consists of several layers; which, beginning at the back of the eye (nearest the outside), are arranged as follows: (1) the choroid; (2) layer of rods and cones; (3) several layers

of a granular character; (4) layer of nerve cells; (5) layer of fibres from the optic nerve. In the centre of the retina is the yellow spot, where we see most distinctly; over this the innermost layer—that of nerve fibres—disappears, the other layers, except that of cones and rods, become very thin, and in that layer the cones are more abundant than elsewhere.

The eye is held in its place and moved by six muscles, the four *recti* (superior, inferior, external and internal), and the two *obliqui* (superior and inferior). It is important to note that a given movement of the eye is always effected in the same way, by the contraction of the same muscles to the same extent.

Mode of Action.—The rods and cones are the direct means by which the vibrations of the ether are communicated to the optic nerve, and thus to the sensory centres in the brain. The optic nerve itself (though actually lying in part above the retina) is insensible to light; the spot where it enters the eye is called the *blind spot*, and light falling on it produces no sensation.

The only way in which the optic nerve can respond to a stimulus is by giving the sensation of light, which follows, not only when the nerve is excited in a normal manner through the retina, but also when it is cut, bruised, or irritated by electricity. Thus sparks are seen to flash before the eyes when the head is violently struck; and disks of coloured light called *phosphenes*, are produced by pressure on the eyeball itself. It has been surmised (though not by any means proved) that there are three different sets of

fibres, each of which is sensitive only to one of the primary colours—red, green, violet—but that all three kinds of fibres are distributed over every part of the retina. The optic nerves, leaving each eye a little to the inside of the centre, meet and form the *chiasma*, but the fibres do not coalesce there; it is in the brain that the nerve-currents derived from the two eyes become united.

The ethereal vibrations probably cause some kind of molecular change in the substance of the rods and cones; and sight, so far as its physical antecedents are concerned, is therefore due to a photo-chemical process.

We must distinguish between (1) the purely retinal sensations, due simply to the stimulation of the optic nerve, and (2) the motor sensations which are very closely connected with them, and which bear such an important share in our visual perception of space.

In the retinal sensations we must distinguish between intensity and extensity (or volume). The latter depends on the amount of the retina covered by the retinal image.¹

The two eyes form a single sense organ for the adult. They co-operate so constantly and so closely, that they cannot without an effort be used separately. In this they differ from the two hands. By shutting an eyelid, they can be used separately, and there is

¹ The local character of sensations arising in stimulation of different portions of the retina is well marked.

more distinctness of impression than we get in the case of the two ears.

The fact that binocular vision gives us, under ordinary circumstances, only a single percept, although there are two retinal images, is considered below.¹ Here we may remark that it increases the area of sensation; though it does not double it, as grasping an object with both our hands does. It also gives us a brighter, though not so clear, a visual image.

The chief qualitative distinctions of the retinal sensations are those of *colour*. It must be remembered that while optical science helps us to understand the physical causes of our sensations, we have no right to substitute optical analysis for psychological. Thus while the physical fact we call white light may be shown to be a mixture of coloured lights, the *sensation* of white is not a mixture of sensations of colour, for it cannot be psychologically analyzed into simpler constituents.

Colour depends primarily on the rapidity of the etherial vibrations; or, which comes to the same thing, to the wave length. Thus *red* is produced when the rate of vibration is 450 billions per second, *yellow* when it is 589 billions per second, *blue* when it is 722 billions per second, and *violet* when it is 790 billions per second. But it must be observed that the same ray of light may cause different sensations of colour according to the part of the retina on which it falls.

¹ Chap. vii., § 6.

Thus a ray which would give the sensation of red if it fell on the yellow spot, gives the sensation of yellow if it falls further from the centre of the retina, and no sensation of colour at all if it falls near the periphery of the retina. The intensity of the light, again, has something to do with the colour perceived. If the intensity be very great, "all sensations of colour tone cease, and even homogeneous rays appear white. Previous to reaching this maximum, red and green pass over into yellow. At the minimum intensities of light every colour tone except the pure red of spectral saturation, appears colourless when seen alone on a perfectly black ground." (Ladd.) Again, the amount of the retinal surface stimulated has something to do with it. If only an extremely small portion is affected by the same ray of light which in a larger amount produces a sensation of colour, a whitish or grayish hue is alone perceptible.

A longer period of stimulation, too, is necessary to produce a sensation of colour than to produce one of mere light, and to produce some colour sensations than others; thus green requires nearly two and a-half times as long as red.

There is no sacredness in the list of seven prismatic colours recognized by Newton; doubtless the number seven was taken in accordance with musical analogy. The colour spectrum is practically continuous, and the number of the tones of colour discriminated will depend on the fineness of the organ of sight and the general discriminative capacity of the individual. Some

authorities speak of hundreds, and others of millions of shades between the extreme violet and the extreme red.

Complementary Colours.—If certain pairs of colours are blended on the retina (*e.g.*, by means of a rapidly rotating top) a white or grayish colour is produced, which does not appear in the spectrum at all. Thus the pairs red and green-blue, orange and blue, green-yellow and violet, all produce this achromatic effect.

Colour Contrast.—We have seen that sensations are not independent, but relative to other sensations which are contiguous to them.¹ This is very noticeable in the case of light sensations. Every bright object tends to appear brighter when surrounded by a space darker than itself, and *vice versâ*; and the colour of a given surface tends to become that of the colour complementary to the surrounding surface. A white surface on red tends to appear green; a green surface on red looks greener than it would do without the contrast.

Colour-Blindness is due to insusceptibility to certain tones of colour, even in the centre of the retina. The commonest case is that in which the red rays are not discriminated, but are confused with green and yellow rays. Cases of violet blindness are occasionally met with; and according to Kirschmann, who has recently written on the subject, other types of colour blindness exist which cannot easily be explained on any of the received theories of colour-sensations. And sometimes only white, black and gray are recognized.

¹ See p. 85 above.

The retina has the power of discriminating points as spatially distinct. At the centre of the yellow spot two points are distinguished, if they are from $\cdot 0046$ to $\cdot 0052$ millimetres apart. The power of discrimination grows less delicate towards the outer edges of the retina, where the cones are less numerous.

With regard to pure white light, Stern has recently affirmed, as the result of a long series of experiments, that the smallest perceptible increase is constant and is equal to about $\frac{1}{3\cdot 6}$. This differs a good deal from the constant usually deduced by experimentalists ($\frac{1}{10\cdot 6}$).

§ 11. Motor Sensations.

There is no doubt that sensations of some kind accompany movements of our limbs and other portions of our bodies, and that these sensations associate themselves very closely with sensations of touch, sight, etc. They, or similar sensations, also arise when there is no actual movement, but only strain in opposition to movement; and when there is a *tendency* to movement or strain.

Such motor sensations have great delicacy of discrimination. We recognize the degree of energy exerted, the degree of continuance of the movement, the degree of velocity of the movement, and the direction of the movement. Combined with other sensations, they increase the power of discrimination. Thus Weber showed that whereas when a weight is lifted in the hand and the motor sensations reinforce

the sensations of touch, $19\frac{1}{2}$ oz. can be discriminated from 20 oz; when the weight is not lifted, $19\frac{1}{2}$ oz. cannot be discriminated from 20 oz, but only $14\frac{1}{2}$ oz. from 15 oz. Again, the perception and remembrance of visual form is strengthened by going over the outline of the object with the finger.

They are of supreme importance in our perception of space (direction, distance, shape, etc.); in our recognition of the sources of our sensations as external objects; in our perception of time; and also of rhythm in both space and time.

Motor sensations are produced with, and impart greater intensity to, the impressions with which they are associated. We confuse the reproduction of the "muscular effort" (motor sensation), made when we listen to a low sound, or see a faint light, with the reproduction of the sensation of the sound or light, and attribute greater intensity to it.

Various theories have been put forward as to the nature of the motor sensations.

(1) That they are directly due to the innervation of the muscles; that they are the concomitant of the current of nervous energy (molecular change) passing from the brain to the muscles. It is an affair only of the central organs, and the efferent nerves. The resulting sensations of innervation, therefore, differ only in quantity and not in quality. This is the view of Bain, and apparently used to be that of Wundt.

(2) That they are indirectly due to the innervation of the muscles; that they have as their physical ante-

cedent, not only the fact that the muscles have received a discharge of nervous energy, but the fact that this discharge has produced changes in the muscle which have been reported to the brain, through the same agency as other peripheral changes, viz., by the sensory or afferent nerves. The sensations differ in quality as well as in quantity.

(3) That the muscles have little or nothing to do with the matter. Schiff holds that changes in the tension of the *skin*, produced no doubt by the muscles beneath, are reported by the agency of the efferent nerves, and that there is nothing essential to distinguish these from other cases of organic sensation of the skin. Goldscheider and James hold that "the *joint surfaces*, and these alone, are the starting-point of the impressions by which the movements of our members are immediately perceived."

To discuss these views is obviously impossible here; but this much must be said. The first theory (sensation of Innervation), was the favourite one with Dr. Bain and the English "Association" psychologists, and in Germany was supported by the great authority of Wundt. Now it is out of fashion. It has not been reconciled with the facts disclosed by experiment,¹ and Wundt has himself disowned it. Münsterberg, however, holds an opinion which slightly resembles it.

¹ Cf., for instance, Flournoy's article on Certain Illusions of Weight in "L'Année Psychologique," 1895, pp. 198-208; James, "Principles of Psychology," pp. 189-202; Ladd, "Elements of Physiological Psychology," pp. 415-18.

In the following chapters it must be observed that the term *muscular-sensation* is used as strictly equivalent to motor-sensation, and implies no special view as to the ultimate origin and nature of these presentations.

Motor-sensations, whether due entirely to the muscles, or to the muscles and other tissues together or to the joint-surfaces as explained above, differ in method of origin and to some extent in quality. The following classification is that usually accepted. Sensations specifically connected with movement are :—

1. Those of unimpeded energy, or free movement, as when we swing an arm.
2. Those as passive movement, as when the limb is moved for us by another.
3. Those of impeded energy, or resistance to tension, as when we hold up a weight.

In the third case there is not direct movement, and some authorities prefer to consider them as belonging to the class of Organic Sensations.

CHAPTER VI.

THE PERCEPTION OF OBJECTS.

§ 1. Perception Involves Inference.

WE saw that Perception involves (1) Revival of past sensations, explicit or implicit, (2) Localization of the percept in space, (3) Grouping of the sensations in certain relations, to form what we call an object, (4) Recognition of this object as belonging to a class.

When I am walking along a country road I see in the extreme distance a patch of dark gray colour and immediately recognize my friend Jones. As I continue my way I expect to see the familiar shape, and I should feel a marked shock of surprise if my dark patch turned out to be only an old woman or a labourer. My perception is biassed by the nascent image which has coalesced with the very elementary sensation. This image must have been lurking somewhere on the outskirts of clear consciousness, ready to come forward into the focus of attention on a very slight provocation.

It is a case of that preadjustment of attention to which we have already referred.¹ No sooner have I

¹ Chap. iv., p. 70. The idea sometimes comes from the outside, as in the suggestions of a conjuror or ventriloquist.

distinguished the patch from the continuous undifferentiated background, than I find myself almost unable to shake off the suggestion that I see Jones. At furthest I will only admit that if it is not Jones, it must be some other man of much the same appearance.

The starting-point is an ill-defined minute patch of dark colour on the retina. This is the *physical* stimulus. A visual impression, or rather group of visual impressions, answering to this must be supposed to exist. But I have complicated these with scores and scores of qualities, which I have no sense-warrant for. Nay, I contradict the sensations I have, and stifle them under the mass of recalled sensations which I add to them. My actual percept (as I can measure if I take the trouble) is so small, that I can see it through the ring of a watch-key held at a distance of several feet from my eyes. Yet I identify it as being the vision of Jones who is six feet high. The colour is gray, and Jones is dressed in black. The shape is different from the shape of Jones, when he is clearly visible.

The portion of the percept which occupies the focus of attention is, we may suppose, surrounded by what James calls a "fringe," and Lloyd Morgan a "margin," of other and much fainter presentations. Sometimes the collateral subconscious images instantly rush upon us with overwhelming definiteness and intensity, and we unfailingly recognize the object. Sometimes they are less definite and insistent, and we hesitate. Rival

images, none of them clear enough to expel the others, arise. Then we begin to reason as to the probabilities of the case. Jones seldom comes this way at this time, and he walks faster than that; and so on, and so on.

Here we see distinct conscious inference coming into play. The process hitherto described, however, resembles it in many respects. In both there is a leap from the actual data to something not explicitly given, and the one process easily passes into the other. Hence the process of perception may not improperly be said to involve a subconscious inference. Unlike an inference proper, the process takes place outside the area of attention, and starts from data not distinctly present to consciousness.

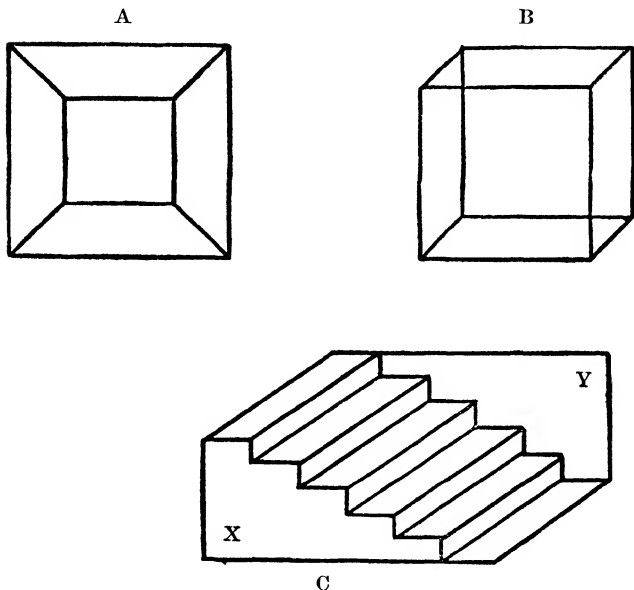
This subconscious inference, or, as Helmholtz called it, unconscious inference, is a necessary feature in perception; we necessarily cannot help making it. Mill's "errors of mal-observation"¹ are not due to the fact that we read into the sensory data what is not already there: that we must always do. But we read into them something that we should not read, if we were gifted with more perfect faculties. We mistake the symbolism of sensation.

That a "pre-perceptive image" is actually imposed we can see in the simplest cases as well as in the more complex ones. Thus we can interpret the annexed figures from one or other of two points of

¹ "Logic," bk. v., chap. iv., § 5.

view, but whichever construction we put on it, there is an inferential process, and an image is read into the neutral lines and angles.

Thus the figure A can be looked at as a truncated



pyramid projecting towards the spectator, or as hollow and receding. The figure B can be looked at as having the highest line nearer the spectator, or further away than the lowest. The figure C may be regarded as a flight of steps, or as an overhanging cornice according as X or Y is thought of as the nearer plane.

When I taught Geometry I found that the figures of Euclid I. 7 and 24 were frequently understood in perspective by beginners. Whichever percept gains the day is so completely victorious, that we find it difficult to reinstate the other.

The savage in a library does not perceive the same things as a scholar. He receives, it may be, if he is very observant, the same sensations ; but they do not mean the same things for him as for the owner of the place. He sees patches of colour arranged in rows ; but he does not perceive bound volumes, certainly not the works of Plato or Shakespeare. The meaning of the symbols is for him something quite different. The same past sensations are not awakened ; there is no half-formed image of black characters on white paper, of Greek or Roman letters ; the patches of colour raise no hint of this sort. He groups them differently, and probably regards the half-dozen blue backs as forming one inseparable whole, and the three red ones as another whole.

We see, then, that in all perception there is a great deal more than a mere reception of sensations. Other percepts are revived ; the new and old sensations are grouped, are projected into space and regarded as qualities of a thing which has an independent and permanent existence. Further, in all perception there is an element of generalization. Even if we do not know its exact name, the perceived thing is regarded as belonging to a class, and not as *sui generis*. It is recognized as a *kind of A*, or a kind of B.

§ 2. Primary and Secondary Qualities.

Descartes drew a distinction between the qualities we perceive in objects. Some we seem to apprehend with the greatest clearness and distinctness ; and we have no doubt that they exist in the object itself ; such are magnitude, figure, motion, number, etc. Others are “ thought with so much obscurity and confusion that I cannot determine whether they are true or false,” that is, whether anything objective corresponds to them.¹ The former he calls Primary, the latter Secondary, qualities. Locke accepted this distinction, and developed it. Primary qualities “ are utterly inseparable from the body in whatsoever state it be.” Secondary qualities depend on primary qualities, and presuppose them. They do not resemble anything in the objects themselves ; the sweet taste is not in sugar itself, nor is the white colour. He gives the following list of Primary qualities: Solidity, Extension, Figure, Motion (or Rest), and Number.²

Hamilton interposed an intermediate class of qualities (*Secundo-primary*) to which he assigned Attraction, Repulsion and Inertia.³ He regarded the primary qualities as deducible *à priori* from the very notion of Matter, as that which fills space. Secondary qualities are accidental and must be learnt by experience.

Spencer accepts the threefold division, but gives

¹ “Meditations,” iii.

² “Essay,” bk. ii., chap. viii.

³ Reid's Works, note D.

it a new meaning and a new nomenclature. The Statical qualities (corresponding to the Primary) are those in the perception of which the subject is active and the object passive, the Dynamical (Secondary) those in which the subject is passive and the object active. In the case of the Statico-dynamical group, both subject and object are active.

All perception, however, is at once active and passive. In all perception there is an external cause; that is, we must assume that the external world (whatever be the meaning we attach to the expression) has something to do with the determination of our percepts of sight, touch, etc. These do not arise entirely from *within*, whether by *within* we mean inside the organism, or inside the mind, of the individual. Some data must come from outside. At the same time all perception involves activity in the subject. In the psychological, as well as in the physical world, there is no action without reaction. But it is true that in the apprehension of the qualities usually called Primary, motor sensations play a great part, and they do not play so important a part in the perception of the Secondary. If we were always incapable of movement we could see colours, and smell odours and taste flavours; but we should have no perceptions of distance, size or direction; and we should not refer to colours, smells, and tastes, as qualities inherent in *things*, having the quality of occupying space to the exclusion of other *things*.

§ 3. Reification.

When we experience a number of sensations of sight and touch at the same time, and these suggest others automatically, we do not content ourselves with noticing the formation of the group—much less do we simply regard them as affections of our own body; we instantly project them and assume that they are attributes, or at any rate, are caused by attributes, of a something outside our body which we call a “thing,” or external object.

From one point of view such a thing is only a bundle of sensations. But we attribute to it (1) a position in space, which we conceive it fills up or occupies; (2) permanence in time, (3) the existence of other qualities which we do not now experience, and some perhaps which we have never experienced—it is a group not only of sensations, but of *possibilities of sensation*; (4) a certain unity, so that it is one and the same in spite of the fact that what we call its attributes are many, and that they vary somewhat from time to time. To these, if we reflect further, we may perhaps add a supra-sensible reality, something which we put in opposition to the perceived qualities as their common basis; and this is what the metaphysicians call the *substratum*.

We should note the part played by language in this process. We readily recognize as *things* those groups of phenomena to which language has given a common name; while other groups which have no common

names are left unindividualized, and are regarded as only features in some *thing*. Contrary to much current teaching, the child does not learn to observe best when left to his own resources, but when his attention is stimulated and guided by the use of language.

The space-qualities we shall speak about in the next chapter. But we may here mention that the specific experience which we call solidity, or impenetrability, is chiefly due to motor sensations. In the last resort what we call a "thing" must be conceived as capable under some conditions, not necessarily ever likely to happen, of yielding us muscular reaction, the sensation of tension; or at any rate as arising from the action of such a thing (*e.g.* shadows, flames). A group of sensations of different qualities are referred to one position in space, and we believe that if we were brought near enough to it we should receive certain tactual and motor (muscular, joint, skin) sensations, corresponding to the visual sensations already received, and that exactly the same tactual and motor sensations could not be received elsewhere.

The apple on the table is not actually red if there be no persons to see it, or if the only persons in the room be colour-blind. We believe that it will appear red to any normal person who sees it under a proper kind of illumination, but in assuming this we go beyond the direct experience of the moment. Its hardness, sweetness, size, and surface appearance will change from day to day. Yet we call it the same apple. We assume that these changing qualities are attributes of

an unchanging *thing*, a hypothetical abstraction which we never actually encounter, because our experience of it is only through the facts of sensation of which we consider it the basis or cause.

We must even conceive that the "thing" in some sense remains when it is no longer the object of sense perception. Berkeley said that *esse est percipi*, that in what we call a thing there is nothing beyond the percept to which we have given a fictitious independence. But while he denied the existence of the old scholastic matter or substratum—"an unthinking substance, or support of extension, motion and other sensible qualities"—he was driven into assuming a substratum of another kind, viz. the ideas of God.¹

§ 4. Illusions of Perception.

Since every percept is the result of the activity of thought, working on the basis furnished by some material given by sensation, it is antecedently probable that mistakes will sometimes occur. The results I arrive at in the presence of a given stimulus will not always be those which others arrive at, or which I on other occasions should arrive at. As in inference, which the sub-conscious process of perception greatly resembles, the individual sometimes errs; but much less often in perception than in fully conscious inference. And in both

¹ Cf. "Principles of Human Knowledge," § lxxvi.; "Three Dialogues," iii.

cases the test is the agreement of present results with those of others, and of ourselves at other times.

Our different senses serve as a check on each other. They often conflict, and, as we have seen, touch and sight are the senses which are regarded as affording the ultimate criteria. It is these, we believe, which give us objective truth, as far as objective truth is knowable. The primary qualities are revealed to us by these two senses. Where these two differ, we are in more doubt than at other times. It cannot be said that either is supreme.

We must remember that all sense-illusions are really illusions of perception. The source of the illusion is not, properly speaking, the data supplied us, but the erroneous reaction of the mind on the data.

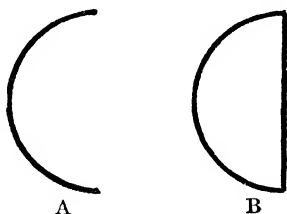
Dr. Sully divides illusions of perception into two kinds, viz., those which arise (1) from confusion of sense impressions, and (2) from misinterpretation of sense impressions. This latter class he also divides into two kinds; (i) where the wrong image which is formed is suggested by the shape of the data of sensation, and is not mainly due to the activity of the mind, as when the spectral figure of Lord Byron was suggested to Scott by a plaid thrown over a screen; and (ii) where the wrong image is due to the pre-adjustment of the attention, as when we seem to see a train, which we are expecting to start, begin to move. Of the two sub-divisions, the former (i) he calls passive illusions, the latter, (ii) active; and he sug-

gests also the names, illusions *à posteriori*, and illusions *à priori*. As a matter of fact, the two main classes cannot be distinguished. In all, or nearly all, cases of illusion there is something presented *ab extra*, which serves as a starting point, but only because our minds are already inclined to be deceived. Thus Scott would not have seen his spectre had he not just been reading a pamphlet about the deceased poet. He was ready to see Byron, and there was sufficient resemblance between what he saw and the insistent image for the percept to take this form. And some sudden movement of the head or eyes is usually needed to yield a starting point for the illusion of the train in movement; such a motor sensation is set up as would, under normal circumstances, arise from the eye following the actual movement, and as we are prepared to see the train start, we do not instantly correct it.

Amongst *optical illusions* the following are some of the most simple.

(a) Optical illusions of magnitude.

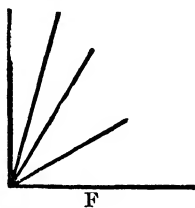
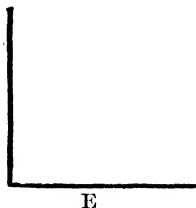
The curve A seems longer than the curve B. On the other hand, the left half of the line C D seems longer than the right



C+++++D

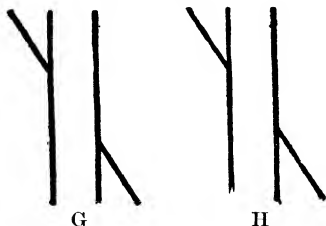
because it is sub-divided; and in the same way, filled

spaces, generally speaking, appear larger than equal spaces unfilled. There is more stimulation, more to interest, and the space therefore seems bigger. Thus the filled right angle F seems larger than the empty one E. Distance measured vertically, or away from,



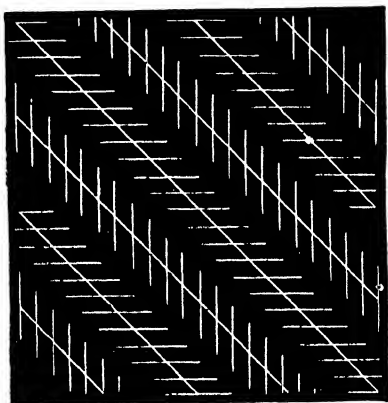
the beholder, usually appears greater than the same distance measured from left to right, or *vice versa*. Thus the upper halves of the letter S and the figure 8 appear the same size as the lower, though as a matter of fact they are smaller; as may be seen by reversing the characters thus, S, 8.

(b) Optical illusions of position.



The two parts of the diagonal line crossing the parallels at G appear not to be in the same straight line, which they are; while the two lines which cross the parallels at H appear to be in the same straight line, and as a matter of fact are not.

More curious still are those illustrated by the following figures (Zöllner's patterns):



(c) Optical illusions of movement.

These are familiar to every railway traveller. The most striking, perhaps, is that produced in a railway station, when objects on a platform seem to fly past us owing to the movement of an intermediate train, which we believe to be stationary as well as our own.

(d) Optical illusions of contrast.

The law of relativity gives rise to many illusions of colour—reds appear more intense in proximity to green, and so forth.

(e) *Touch* gives us many examples of illusions. One of the most famous is that described by Aristotle, in which the middle finger is twisted round the index finger, and a pea or other small object placed between them. This object is felt double.

(f) The *temperature-sense* gives us illusions of contrast; the same tepid water appears cold to a hand that has been immersed in hot water, and hot to a hand that has been immersed in cold.

It is worth while to add that the term *hallucination* is reserved for those false percepts for which there is no discernible external basis. There is, of course, always some cause internal to the organism; and probably some external cause also, although the latter cannot be clearly traced. Thus the hallucinations of *delirium tremens* are most likely due to the *muscæ volitantes*, and other specks which float before the eyes of most people, but are persistently disregarded by them under normal conditions. Illusions occur in the most sane, but hallucinations are abnormal, and

when persistent are usually indicative of serious mental trouble.¹

§ 5. Idealism and Realism.

The question has been raised, Is all Perception illusory? Taine, for instance, describes all perception as hallucination or illusion. Our vision of things, regarded as permanent and independent of the process of perception, is due to an error of judgment, brought about by habit and bad metaphysics.²

But this is to confuse two separate points of view. By *real* we mean what has objective existence; the fact of our holding that what are called *material things* are after all only expressible in terms of mind does not prevent them from being real. A thing is real which is known in the same way by all normal individuals placed under similar conditions for perceiving it. Berkeley did not deny that a cherry is real; what he denied was that for the sense qualities we perceive there is an ultra-sensorial basis absolutely different from, and independent of, consciousness. As far as psychological analysis goes, what we call things are merely percepts, complex presentations. Material things are for the psychologist, at most merely permanent possibilities of sensation.

¹ The term *delusion* is given to persistent false judgments, which do not give rise to false percepts, e.g., the conviction that one is really Julius Cæsar returned to life, or the rightful heir to a large estate.

² Taine, "De l'Intelligence," liv. ii., chap. ii.

From the point of view of Psychology, the object-world is a mere *abstraction*, to which we have no right to give an independent existence. A coherent series of presentations, having certain peculiar characters, is separated from another coherent series, having a different character, and called the external world or object-world, while the latter series is called the subject-world. All the qualities and attributes of the assumed external world are really phenomena of our own *minds*; and we have no more warranty to affirm their independent existence apart from the minds which perceive them, than we have to affirm "that roundness exists as a separate entity or detached from all round things."

Psychology, however, has not the final word on the question. What used to be called *prima philosophia*, and now Metaphysics, has the task of bringing together and comparing the assumption and results of all the different departments of human knowledge. It is for her to decide the question whether the assumed "material world" exists, in the sense of a world entirely apart from and independent of Mind.

As a statement of the "Realist" position we may take the argument of Herbert Spencer, as given in Part VII. of the "Principles of Psychology." It may be briefly summarised thus :

It cannot be denied that we have an apparent intuition of the external world. People whose ideas have not been distorted by systems of Metaphysics, certainly believe in the existence of external objects.

If you ask them what they are conscious of in Perception, they will not tell you that it is a "synthesis of object, *plus* subject," or anything of that kind, but that they are conscious of external things really existing apart from the mind which perceives them.

Now all our knowledge rests ultimately on intuitions, and the ultimate test of our reasoning is intuition—viz., the intuition, that what is absolutely and finally inconceivable cannot be true. Every long chain of reasoning involves many appeals to this test, and is therefore liable to error in proportion to its length and complexity. Yet philosophers have virtually assumed that such a chain of reasoning, if it contradicts a simple intuition, is more likely to be right than the intuition; which is obviously absurd, besides being at variance with the tendency of science, which everywhere regards observation and perception as more authoritative than theory and reasoning.

Realism is *prior* to Anti-realism in order of time; it is *simpler* as the result of a less involved process of the mind; and the elements of consciousness involved (sensations) are much more *vivid* and *definite* than those involved in the metaphysical theories which are opposed to it. Again, "Language refuses to express the idealistic and sceptical hypothesis;" the terms used everywhere assume the existence of the external world whose existence is disputed. Besides this, the cumbrous anti-realist theories always break down by their own weight; not to go deeper, Berkeley and

Kant¹ have both of them to postulate some sort of cause for our sensations, external to ourselves. Such theories do in fact assume the validity of realistic conceptions while trying to destroy them.

Besides this "negative justification of Realism," there is a "positive justification," because we can show that the Realistic attitude of mind is the result of "consciousness working after its proper laws." Realism does not result from a "natural propensity at variance with the laws of thought," but is an "inevitable outcome of the mental process gone through in every valid argument," viz., the classification of states of consciousness according to their cohesions with each other. "We find that our states of consciousness segregate into two independent aggregates, each held together by some principle of continuity within it;" viz., the *ego* and the *non-ego*.

But even Mr. Spencer is not a mere Realist. He does not accept the doctrine of "the plain man" that things are in themselves what they appear to us in perception. His theory, which he calls Transfigured Realism, "simply asserts objective existence as separate from and independent of subjective existence." The facts of the actual objective universe are only *symbolized* by our percepts. This view might almost have been accepted by Berkeley himself, who only denies that the basis of our percepts is something distinct from mind, and not that they have an objective

¹ Kant's position is not quite certain. Some writers consider him Idealistic, and others Realistic.

basis of some kind or other. But the Idealist asks, why suppose the existence of another substratum of which we can know nothing, when we have one which we know? We know that Thought, or Consciousness exists, and that what is in consciousness is absolutely real so long as it is in consciousness; why then try to find for the particular kind of mental fact we call an external percept, another basis essentially different from consciousness? The distinction between the world of percepts and the world of feelings and thoughts is, after all, a distinction within consciousness itself, and there seems no reason for attempting to transcend consciousness, and trying to find an explanation of the distinction in the assumption that an unknowable orderly universe exists apart from and independent of consciousness.¹

¹ See T. H. Green, "Prolegomena to Ethics."

CHAPTER VII.

THE PERCEPTION OF SPACE.

§ 1. The Problem of Space-Perception.

THE psychologist is under no obligation to examine the metaphysical question, *What is Space?* what do we mean in the last resort by extension? Whether space is an objective reality which would exist if consciousness did not exist; or a quality of things which we look at in isolation, but which exists only in the things, and which has come to be known just like any other quality of things (for instance colour, or weight) from experience; or whether it is a set of relations not inherent in the things themselves at all, but impressed by the mind on them—these and other questions do not concern us. It is sufficient that for the adult human being, whether civilized or savage, there is a necessity he cannot evade to refer certain types of sensation to spatial relations, while with respect to other kinds of sensation the necessity does not so obviously exist. Whatever may be the real nature of Space, there can be no doubt that such a necessity exists in the case of (say) sensations of colour, and does not exist in the case of (say) sensations of

musical tone. Wherein lies the difference we need not attempt here to inquire. That is a question largely metaphysical, that is, dealing with the nature and *meaning* of experience ; and in so far as it is psychological it involves a great deal more knowledge than can be acquired from a student's handbook.¹

There are, however, two purely psychological questions which we may attempt to answer :

(1) How do we come to accurately localize the physiological origin of our sensations at different parts of the body itself ?

(2) How do we come to accurately localize in space outside the body the assumed objects of perception ?

§ 2. Localization of Sensations.

It must not be assumed that the sensations are felt as within the body, at the sensory centre or elsewhere, until localized. "If we consider the behaviour of new-born animals, we never find them betraying that they are first of all conscious of their sensations as purely subjective excitements."² Hence the expression the "eccentric projection of sensation" is misleading. At first sight it is startling that we feel the friction and resistance of the paper at the end of the *pen* and not in the hand, that we do not

¹ See Mill, "Examination of Hamilton," chap. xiii. ; Caird, "Philosophy of Kant" (Transcendental Æsthetic).

² A. Riehl, quoted by James, "Principles of Psychology," ii. 82.

refer colour to the eye but to the object at a distance, and that the injured man still refers pains and pressures to the foot or hand which has been amputated by the surgeon. It seems that we ought to refer our sensations to our own bodies, or indeed to the sensorial nerve-centres in the base of the brain. But until experience has taught us how to localize them, our sensations have no distinct spatial reference at all. We do not have to unlearn a previous innate localization in order to acquire the new one. There is, therefore, no "extradition of that consciousness which has its seat in the brain to a definite part of the body"; for consciousness has not its seat (in this sense of the term, at any rate) in the brain; that is, we never refer sensations, even at the earliest part of our lives, to the brain.

It is now usually admitted that we have no *immediate* knowledge of the part of the body acted upon by a stimulus which is the physical antecedent of a sensation. The baby appears to have no knowledge of the spot in which the pin has run into him, and even adults sometimes localize unusual sensations wrongly. Localization is the result of experience.

But what is the starting-point, the datum from which the subconscious inference is made?

The presence of a single sensation has in itself no spatial significance. "No single *quale* of sensation," as James says, "can by itself amount to a conscious-

¹ See § 6 below for a similar case, that of erect vision.

ness of position." . . . "A feeling of place cannot possibly form an immanent element in any single isolated sensation."

What, then, enables me to know that the pin-prick I am aware of is just above my right elbow?¹ The answer lies in the fact that with the sensation of pin-prick is dimly aroused another group of sensations; a vague subconscious presentation of the special skin-sensations which are produced by stroking and pressing the skin in that neighbourhood. The same stimulus which causes the sensation of pricking has aroused in a less definite way certain other sensations. This group of subconscious sensations forms the *local sign* of that part of the surface. The position of the pin-prick is revealed to us by arousing the subconscious images of sensations produced by stimulating a number of other adjacent points of the skin.

But how have we come to know that the sensations of touch, thus subconsciously apprehended, belong to a region just above the right elbow? This has been taught us by constant experience. Certain dim, marginal or subconscious sensations, always accompanying touches on that area, which I make with my left hand, or which are accidentally effected. They differ from other dim sensations accompanying the sensation of touches on the forearm, and on the shoulder. It is not too much to say with Professor

¹ In what follows sight is supposed not to co-operate.

James¹ that "the whole surface of the body is in a state of semi-conscious irritation which needs only the emphasis of attention, or some accidental [inward] irritation to become strong at any point." That the sensations derived from the same stimulus do vary in accordance with the particular locality of the stimulation is thoroughly established.²

Besides these local signs, sensations of movement are concerned. At nearly every moment of our waking lives, especially in childhood, our limbs are in movement, and these movements are accompanied by motor presentations, which are more or less retained. By this means the number of experiences of localization is increased; experiment takes the place of mere observation, so to speak; and a second series of sensation-traces is formed side by side with the series of local signs. Not only are two impressions on the arm each characterized by its own sub-quality, but we learn that the difference between them can be expressed in terms of movement.

If I bring the top of the first finger of my left hand from the point A to the point B, both on the right fore-arm, there is aroused at A a sensation of contact characterized by its special local sign; at B a similar sensation, just as would happen if someone else touched me at the two places. But I also learn that to

¹ "Principles of Psychology," ii. 160, note. It seems to me that the word I have inclosed in square brackets would be better away,

² See also chap. v., § 8.

proceed from the one sensation to the other, I must experience a series of motor sensations, and that if I then take the tactile sensations in the opposite order, the train of motor sensations will also be reversed. If I run the left first finger along the skin, I have a third series of sensations, also tactile, which is reversed when the motor series is reversed. These motor and motor-tactile sensations give a new meaning to the local sensations. These last are found to be *signs*; signs of room for movement. Apart from the movement the differences of tactile presentations would not mean space, or locality. And on the other hand, the motor sensations, without the qualitative distinction we call local-colour, would not give us any hint of position in space.

It must be remembered that by no valid manipulation can spatial differences be got out of qualitative. Local signs are, after all, only *qualia*. If they imply more than quality, then this something is already an implicit space-determination. This something more is the character of *extensity*, already referred to.¹ Local signs are the data of localization; but this implies some antecedent knowledge of space, or at any rate a tendency to arrange our sensations in a spatial order. Lotze's theory of local signs is not an explanation of why we refer sensations to space, rather than to time, or to some other form of relation, but only an explanation of why we attribute the

¹ See chap. v., p. 83.

sensation to this place rather than that place. A word of caution is, however, necessary on this point.

It is indeed true that the use of such a word as *localization* or reference to space naturally implies that we have a knowledge of space, apart from the act of localizing. If I want to localize a city on a map, or a book on a table, I must have some knowledge of the map or table, at any rate know that there *is* such a thing as the map or the table. "But in the evolution of our spatial experience impressions and positions are not thus presented apart. The truth is that the body as extended is from the psychological point of view not perceived at all apart from the localized impressions. In like manner impressions projected (or the absence of impressions projected) constitute all that is perceived as the occupied (or unoccupied) space beyond. It is not till a much later stage, after many varying experiences of different impressions similarly localized or projected, that even the mere materials are present for the formation of such an abstract conception of space as 'spatial reference' implies."¹

So far, we have supposed sight not to co-operate in the normal individual. It does actually co-operate from almost the first. The retina, like the skin, possesses differences of structure; and these are sufficient to afford a "local colouring" to sensations of light, as Helmholtz, Wundt, and other psychologists

¹ Ward, article "Psychology," p. 55.

recognize. Lotze holds that the local signs of sight are more complex than this. They consist, he says, in the amount of muscular movement and therefore of motor sensation which is involved in fixating the eye, so that a given point looked at is seen with the most perfect clearness possible; that is, so that the image of it falls in the centre of the yellow spot. We may safely assume that the two (local subconscious sensations due to difference of structure, and motor sensations) co-operate.

There are auditory local signs, since we know in which of two ears a sound is loudest; but it can be hardly said that taste and smell have local signs. Some organic sensations can be localized, though vaguely, and the doctrine of local signs may be extended to cover this case.

§ 3. Space-Perception through Touch and Movement.

The process of acquiring a knowledge of the position of objects in space, goes on *pari passu* with the process of acquiring a knowledge of the locality of touches. For the sake of simplicity let us take the case of a person born blind.

The child moves his hand along the edge of his cradle. A series of touches is accompanied by a series of motor sensations. The experience is differentiated from a similar movement which he makes with his hand over his face, by the fact that there is only one series of tactile sensations, viz., those of the finger-ends.

If the motor sensations are made to occur in reverse order, so do the others. If he starts in the middle he can experience the two halves of the series of tactile sensations. A rudimentary knowledge of *position* in space has begun, the relation of a given point to the rest of the series.

If he spreads out his hand he obtains a somewhat similar series, together with the sensation of extensity in a more marked form than he obtained it from his finger-tip. Thus he gets the perception of *surface*.

In the perception of *solidity* we must have the movement of grasping with one or both hands. The sensations accompanying grasping, (viz. those of touch, including contact and extensity; and of movement, including tension, joint-play, etc.) also help him in recognizing *form* and *size*.

If the baby begins with a touch on his face, passes the intervening space and comes to the side of the cradle, he begins with a double series of tactile sensations, those of face *plus* those of finger; then comes an interval in which the motor sensations are unaccompanied by any tactile sensations; then the finger sensations re-appear, sensations with which he has already become familiar. He then begins to recognize the fact which we call *empty space*, mere room for movement without accompanying tactile sensations. At the same time he begins to recognize the distinction between the extended thing he will afterwards call his body, and other extended things which he will call objects in space.

There are three different series :

- (1) Motor sensations.
- (2) Sensations in the moving fingers, called by Ward, "active touches."
- (3) Sensations in the part of the body touched, called by Ward, "passive touches."

Perception of *movement in objects* occurs when change of touch-sensation occurs without muscular movement, as when a blanket on which the child's hand rests is pulled from under it; and also when motor sensations are experienced without any change of tactile sensation, as when a stick which the baby has clutched is shaken by the nurse.

We have taken the case of touch and movement first, because this gives us a simpler problem than if we also took in visual sensation. But there is no reason to assume that this order, dictated by logical considerations, is the proper chronological order. We must not say, as Bain appears to do, that after a certain amount of space-knowledge has been reached, "the eye comes in." The education of all the senses goes on together from the very first.

§ 4. Space-Perception through Sight.

The movements of the eyes play a great part in visual space perception. But not the whole of it. The retina has a set of qualities of its own. Purely

optical sensations can be discriminated with regard to extensity, position, etc., even if the eye be absolutely fixed. And if the eye always had been fixed, there is no doubt that a meaning could have been given to these sensations, and that they would have served as symbols entirely on this account.

Visual magnitude, visual distance, and visual form, etc., have, however, all come to have a meaning which is only to be understood by reference to touch and movement.

The *actual size* of an object means for us the size which we should attribute to it if we could touch and stroke it. Visual magnitude varies in accordance with the magnitude of the retinal image, and as we walk towards an object visual magnitude changes every moment, as we can see if we stop to measure it. To these changes we pay, ordinarily, no attention. They have no interest for us as practical persons, serving only as symbols of what the size will be when we get up to it. This is, if we may use an expression open to some objection, subconsciously *inferred* from the data supplied by the eye—from the apparent size (due to the size of visual image), the degree of definition, the colour, etc.—from which we concurrently arrive at our estimate of the distance of the object. Why do we usually hold the tactual estimate to be the true one? Because the tactual is the most important aspect of an object from a *practical* point of view. “When two sensorial space-impressions, believed to come from the same object, differ, then *the one most interesting,*

practically or æsthetically, is judged to be the true one." ¹

Distance, like *magnitude*, is a subconscious inference. I am led to realize the distance of a given object by the influence of the following facts on my apprehension: (1) the retinal magnitude of the image; (2) my knowledge of the real size of the object; (3) the distinctness of the image; (4) the degree of flattening of the lenses of the eye; (5) the convergence of the axes of the eyes; (6) the degree of difference of the two retinal images; (7) the perception of the surrounding objects, and our estimate of their relative positions.

Of these the first, second, fourth, and last are perhaps of chief importance. Our estimates of distance and real magnitude vary inversely; and in any given case we have the alternatives of perceiving a big object at a considerable distance or a small object close to us. The subconscious impression of the degree of convergence of the eyes commonly decides this for us when the object is not many feet away. When by special apparatus the magnitude of the retinal image is kept unaltered and the convergence of the eyes increased, the object is judged smaller; when the convergence is diminished, the retinal image remaining the same, the apparent magnitude increases. The stereoscope shows the important part played by the sixth factor. Two slightly different pictures of the

¹ James, "Principles of Psychology," ii. 181.

object, as seen by the two eyes, are combined in one picture by the use of wedge-shaped lenses, and the resulting perception is that of a single solid object lying midway between the two eyes, as in the actual perception of such an object.

This shows that the use of the two eyes is of supreme importance in the perception of distance. We could, indeed, acquire a knowledge of the third dimension in space by the employment of only one eye, if this were supplemented by muscular sensations; but the immediateness and directness of our actual knowledge of it would be wanting. The chief thing to be borne in mind is, that in the case of near objects the eyes give more or less dissimilar images, and that the convergence of the two eyes is measured by the muscular exertion needed to produce it.

The power of apprehending *form* by the eye is not in the first place given by retinal sensations alone. Sensations due to movements of the eye are concerned in it. Perception of form is after all only perception of the relative magnitude of parts, and of the direction of lines, in both of which, as we have seen, motor sensations co-operate.

Although the retinal sensations are sufficient, in the case of the adult, to reveal form, they derive their meaning from the eye-movements which accompanied them. Experience was necessary here, as in the case of distance.

§ 5. Berkeley's Theory of Vision.

The plain man believes that he can see form, magnitude and distance as directly as he can see colour. Berkeley in his "New Theory of Vision" (1709), attacked this belief. According to him the eye gives us only sensations that are meaningless in themselves, but serve their whole purpose (so far as the perception of the space qualities of objects go) by suggesting sensations of touch. He tells us that "The ideas of space, outness and things placed at a distance, are not strictly speaking the objects of sight; they are not otherwise perceived by the eye than by the ear." (§ 46.)

The sensations of sight, or hearing, merely give a ground of inference—a hint that the object is there. He compares them in this respect to spoken words: when the word is uttered the corresponding idea is instantly presented and the word overlooked. "So likewise the secondary objects, or those which are only suggested by sight, do often more strongly affect us, and are more regarded, than the proper objects of that sense, along with which they enter into the mind, and with which they have a far more strict connexion than ideas have with words. Hence it is we find it so difficult to discriminate between the immediate and mediate objects of sight [*i.e.* true visual images on the one hand and the tactual and motor images they raise up on the other]

and are so prone to attribute to the former what belongs only to the latter." (§ 51.) "The objects of sight and touch are two distinct things." (§ 50.) It requires experience to learn that what we see is the same thing as what we touch.

This view was adopted by Mill and Bain, though they laid more stress on the motor sensations than did Berkeley, and less on the tactual sensations. For a long time it reigned supreme, but it has fewer upholders now. Many recent writers hold that the eye suffices to give us knowledge of two-dimensional space, that is, of a plane at right angles to the axis of sight. Thus Sully admits that optical sensations (including those of eye-movement) are sufficient for this, while he holds with Berkeley and Bain that they do not suffice for apprehension of distance. "Sight, though it does not give us the experience underlying the idea of distance, supplies us with certain variable signs of this."¹ An increasingly large number of psychologists, however, maintain that only visual sensations are necessary, whether (as some hold) these are partly due to movement, or (as others hold) purely retinal. Thus Ladd says: "Spatial perception, at least in germinal form, is native to the mind as a synthesis of the qualitatively different sensations which result from stimulating simultaneously the retinal mosaic of nervous elements."² James goes still farther, and summarizes his view thus: "The measurement of

¹ "Human Mind," i. 248.

² "Elements of Physiological Psychology," p. 427.

distance is, as Berkeley truly said, a result of suggestion and experience. But visual (retinal) experience alone is adequate to produce it, and this he erroneously denied.”¹

What is suggested is other visual images, “optical objects not actually present.” This, however, seems greatly to underrate the importance of the motor and tactual elements in sight.

§ 6. Erect Vision and Binocular Vision.

Two well-known problems will serve to illustrate the part played by motor and tactual sensation in perception. How is it that while the retinal image is inverted we see things in an upright position? And how is it that having two eyes each with its own retinal image we see only one object and not two?

The meaning of *up* and *down* is given us by muscular sensation. What we mean by *up* is movement away from the direction in which the force of gravity causes bodies to move—movement against gravity. What we mean by *down* is movement in the same direction as bodies fall. We pay no attention whatever to the actual position of the image on the retina, of the existence of which we, of course, know nothing directly. The fact that there is an image on the retina is interesting from the point of view of optics, and from that of physiology. But it has no direct psychological importance. The sight-percept, or

¹ “Principles of Psychology,” ii. 215, 220.

visual image, is not in any sense the same as the retinal image. The former is a mental phenomenon, in close relation with other mental phenomena, viz., the sensations of movement and touch, and in no kind of conscious relation at all to the retinal image. I have to raise my hand, and exert force against gravity, if I am to see my hand close to the top shelf of my bookcase; if I let it fall, my hand is seen backed by the lower shelves. The direct retinal stimulus only serves as a hint or suggestion. Just in the same way *right* and *left* are only relative to motor and tactual sensations. A very little experience will, in fact, enable us to associate with a given visual image the opposite movement to that which usually accompanies it. This the microscopist learns. He soon acquires the habit of moving objects on the stage in the opposite way to that which ordinary experience suggests.

Binocular vision has already been alluded to.¹ Attempts have been made to explain on anatomical and physiological grounds as well as psychological, how it is that with two retinal images we get only a single percept. It has been suggested that the fibres of the optic nerves of the two eyes coalesce in the X-shaped *chiasma*; but this is devoid of foundation. It has been thought that there exist *identical points* in the two retinas, anatomically connected, such that if the image of an object falls on the "identical points" it appears single. This is nearer the truth.

¹ See chap. v., § 10.

Although there are not identical points, morphologically related, there are *corresponding parts*, which have been established by experience. We have learnt by experience the fact that when two similar images fall on these, the object which causes them is single. And although we are not conscious of the existence of the similar images, they serve as sufficient hints to determine the perception.

This is due partly to individual experience, partly to inheritance from our ancestors. In squinting, the axes of the eyes do not converge properly, the two images no longer fall on corresponding parts of the two retinas, and double vision is the result, unless the individual is able to establish new retinal relations; if this occurs, the parts which do not normally correspond come to do so. Double images also occur in drunkenness, when command of the muscles of the eye is temporarily lost. Our customary vision is binocular, although it is a question whether we do not use the right eye chiefly and mainly, the left serving as an auxiliary. We judge of direction not in relation to the single eye, but in relation to the median plane of the body.

§ 7. Auditory Space-Perceptions.

The recognition of the *direction* of the source of the sound probably depends on several distinct factors: viz., (1) a specific quality of sensation peculiar to each ear (local sign) so that a sound heard by the right ear differs in quality from what we must call the same

sound heard by the left ear ; (2) difference of intensity in the sounds as heard in the two ears ; (3) Sub-conscious motor sensations accompanying the innervation of muscles which turn the head.

The first factor, which has been specially emphasized by Stumpf, is more open to question than the others. The third needs a word of explanation. When a sound is heard there is a natural tendency to turn the face towards the source of it. We go on turning the head until we judge the intensity of the sound in both ears is the same ; and then locate the sound directly in front of us. The external cause of the sensation may, however, be directly behind us, unless we (sub-consciously) notice in which ear the impression is strengthened, and in which ear it is weakened, as the turning takes place. It may be remarked that the inference here is more conscious and less automatic than in the case of tactual or visual localization.

The *distance* of sounds is perceived by a process of sub-conscious inference, analogous to that which enables us to estimate the distance of objects of sight, but more conscious and hesitating. The relative intensity of the sensation is the chief factor. A sound of a well-known quality, but of a low intensity, we recognize as coming from a distance. This is at the bottom of the performance of ventriloquists, when they imitate the noise of some animal outside the room.¹ When neither quality nor distance is known, we are altogether at a loss to localize it.

¹ A great deal depends on suggestion. See above, chap. vi., § 1.

The feebleness of an auditory localization is due to the want of a fine discrimination of locality in the ear. The local signs are few ; we can only just tell, with an effort, in which ear a sound is loudest. As we move our head the sensation varies very little. The sensations accompanying movements of the head are not finely discriminated. The needs of life have not forced on us the close association of motor and auditory, as of motor and retinal, sensations.

CHAPTER VIII.

MEMORY AND IMAGINATION.

§ 1. Retention.

PRESENTATIONS once experienced are sometimes revived. This is one of the most important and familiar facts of our mental life. They may be revived as independent images, sometimes called *free images*; or as *implicate images*, that is, images involved in the process of perception. The latter do not thrust themselves on our notice, and need careful analysis to detect.¹ The former are familiar to all. We all know how an idea gives rise to other ideas which have little in common with it, and which are quite independent. The percept of Plato's works suggests ideas of Socrates, of the speculations which he is represented as conducting on the subject of Justice, and so forth; and the idea of the person who gave me the book. To take the last. Where has that idea been since I previously experienced it? I have "retained" it; but what is the meaning of the term "retained"?

Several different views have been put forward.

(1) The idea has been stored up in the mind, as a

¹ See above, chap. vi., § 1.

coin is kept in a box. But it may be objected that the only way an idea can *be* in my mind is by my being conscious of it. The crude metaphor of box and coin is quite out of place. A state of consciousness, when I am no longer conscious of it, can only = 0. It no longer exists, as an idea; all that remains is the possibility of its revival, and this is not an idea.

(2) Accordingly a modification of the hypothesis is proposed. It is suggested that the idea remains "below the threshold of consciousness." It has been from the first gradually fading away, losing its intensity, and lapsing further from the focus of attention. It can be brought back into full consciousness; it still remains, in a sense, conscious, *i.e.*, known with a minimum of consciousness.

(3) Since, however, an unconscious idea, or a sub-conscious idea (for in this case the terms mean practically the same thing), is inconceivable, some psychologists deny that presentations persist at all. What does persist is the physiological machinery which we suppose to serve as a basis for conscious processes. The brain and nerves remain, and they have acquired habits of action. Every psychical fact corresponds to a neural change; and this neural change tends to recur. A functional disposition, as Wundt calls it, is instituted.

On this view *retention* is not a psychical fact at all; *revivability* is a psychical fact, but its condition is the physiological fact of retention. The recall of a presentation has two aspects. "The bodily side is the

functional excitement of the tracts and paths in question: the mental side is the conscious vision of the past occurrence, and (in Memory proper) the belief that we experienced it before."

It is not necessary in an elementary book like this to attempt to weigh the respective merits of the last two hypotheses. But it may be pointed out that the acceptance of the second theory does not prevent us from accepting the doctrine of physiological dispositions; while unqualified adhesion to the third hypothesis involves a disregard of the law of Continuity, and the intrusion of purely physiological concepts in a psychological explanation.

§ 2. After-images and Primary Memory-Images.

The simplest case, intermediate between the presentation and the re-presentation, is that of the after-image. Analysis of their sensations reveals to most children the existence of coloured patches after they have been looking at a bright light; and they notice that these persist and are capable of being revived by rubbing the eyes, long after they have begun to fade.¹ Two kinds of visual after-images are recognized:

(1) Positive after-images, produced by looking at a light for a very short interval, say $\frac{1}{2}$ of a second.

(2) Negative after-images, produced by longer ex-

¹ I have had adult pupils of intelligence and education, who alleged that they had never noticed after-images in any form.

posure, and exhibiting the colours complementary to those of the original.

Some writers (Fechner) keep the name after-images for the second type ; and call the former memory-after-images. To produce the latter, attention is necessary, and, as we have said, a very short fixation of the original.

Something analogous to the visual after-image occurs in other orders of sensation. After knocking at a front door, we are often so acutely conscious of the sound that we can count the blows, although we did not do so when they actually fell on our ear. In the same way we often count the strokes of the church clock after it has ceased to sound. After-images of hearing also occur after noises of great intensity ; a railway whistle continues for some seconds to ring in our ears.

Negative after-images of taste have been noticed. After very sweet solutions, a sourish taste occurs (possibly due to the rapid formation of acids), and after very bitter ones, a sweetish taste. That tastes interfere with each other is well known ; the palate is spoiled for wine after eating sweetmeats.

There are temperature after-images, all positive, which can be experienced by pressing a cold coin to the forehead ; on removing it the sensation of cold remains though the temperature of the skin is rising. There are contact after-images, and these can be experienced by touching the back of the hand with the top of a penholder.

(3) Some psychologists notice separately what are called *recurrent percepts* or recurrent sensations. They resemble positive after-images, but follow the original percept after a considerable interval. They closely imitate the original percept, and are so vivid as to have the character of hallucinations. Such images of the objects they have been observing are sometimes seen in the dark, or on the ceiling, by microscopists hours after their work is finished.

The after-image and the recurrent sensation are still an affair of sensation and not of memory. In every case, we can have little doubt, the physiological stimulus persists, and what is perceived is the weaker sensation due to this weaker physical stimulation. It is projected outwards, if the original sensation is so projected. Thus the visual after-image is seen projected against the ceiling or the pages of a book.

(4) *Memory-images* or *imagination-images*, properly so called, differ in these respects from the primary after-images: they are recognized as mental and not regarded as external phenomena; they are less bright but have more colour than the primary after-images; they do not follow the movements of the head and eyes; they are seen in perspective, as though having three dimensions, while after-images are only in the flat; they can be voluntarily changed. Finally, they remain positive, whereas the positive after-image passes at once into the negative, or complementary type. When the percept has been recently experienced, the true memory-image or imagination-image (as dis-

tinguished from the so-called memory after-image) is very vivid.

(5) The primary memory-image soon passes into the ordinary and less vivid memory-image. After a minute or so it has lost its distinctive character.

To sum up we may distinguish (1) Primary after-images; (2) Negative after-images; (3) Recurrent percepts; (4) Primary memory-images; and (5) Ordinary memory-images.

§ 3. Imagination and Memory.

By a memory-image (or simply, an image) we mean a revived percept. Such a revived percept is never an exact reproduction of the original percept. The edges are usually blurred, some part of the original is disregarded, and the whole thing is, as a rule, fainter and less impressive. Under normal circumstances we do not mistake such an image for a percept. Memory images are not confined to sight. We have tactual, auditory, olfactory, gustatory and motor (strain, joint contact, skin tension, etc.)¹ images; although images of sight, hearing, touch and movement are by far the clearest and most important. These free memory-images or "ideas," make up the train of presentations which we can distinguish as imagination, memory, and so on. We have a world of ideas which stands in

¹ A special feature of the motor images is their tendency to initiate the movement itself. See below, chap. xii., § 3.

marked antithesis to the world of perception, and as a rival claimant on attention.

Although we have ordinarily no difficulty in discriminating an idea from a percept, the child begins by confusing them. The infant with his "primitive credulity" accepts memory-images as external realities; and he probably comes to recognize their distinctive character chiefly by the failure of his attempts to treat them as percepts. He comes to find that (1) percepts are, as a rule, more vivid and distinct; (2) they do not depend on his movements; (3) they occur suddenly and cease suddenly.

Images, as mere images, have no reference to our own past; whereas what we ordinarily call a memory necessarily has such a reference. Revival of past impressions may therefore take the form of:

(1) Imagination, where the image is developed, without any reference to the context in which we have experienced the percept. This development of the image may vary from a very slight to a very high degree of perfection. The musician imagines a tune very distinctly and completely, which the non-musical person imagines indistinctly, incompletely and inaccurately.

(2) Memory, by which we mean imagination together with a double reference, subconscious and conscious, to our own past. In memory proper there is a kind of consciousness which it is difficult to characterize. This, indeed, accompanies all *recognition*, whether of a present percept or a revived percept (image). It is due

to the revival with the image of a vague mass of sub-conscious concomitant impressions. When this dimly perceived and indefinite aggregate is accompanied by the reinstatement of definite percepts received at the same time, we have not only recognition, but memory.¹

The term Memory is, however, ambiguously applied to the following more or less different facts.

(a) *Retention* in the mind, whatever that may mean, whether a psychical or purely physical fact (see § 1 above). I am said to remember the address of a person, even when I am not actually conscious of it, if I can revive it.

(b) *Recognition*, where on perceiving an object I am conscious of having previously perceived it; or on recalling an image I am conscious of having previously had the image or percept. This is due to the marginal or subconscious reproduction of some of its concomitants.

(c) *Memory* proper, or recollection, in which we bring the retained ideas before the attention, together with a conscious reinstatement of some of the concomitant percepts.

(d) *Imagination*, in which an image is more or less definitely put before us without necessary reference to other recalled percepts or to our own past.

These powers differ in degree in one and the same person. We often say that a man does not know much but that he has his knowledge at his fingers' ends, that is, his power of reproduction is considerable

¹ See Ward, article "Psychology," p. 63; James, "Principles of Psychology," i. 652.

while there is little that is retained. The power of imagination proper may be weak and yet the memory may be good. We all know how much easier it is to recognize a tune we have once heard than to reproduce it as a series of auditory images. [Binet, after a prolonged set of experiments, found that the power to recognize was sixteen or seventeen times as great as the power to recall.¹] Visualization (visual imagination) is often very weak in persons who have a retentive and facile memory for abstractions. But as a rule, these different processes are in the same person "all strong or weak in reference to the same classes of objects;" e.g., if a man's mind be particularly retentive of words, his verbal imagination will in like manner be specially clear and definite.

Imagination is spoken of as *reproductive* and as *productive*. In the former sense it is, as we have seen, involved in all memory and conception in some degree, though in different degrees in different people. By productive, or constructive, imagination, we mean the power to form combinations of such reproduced elements different from any combinations actually experienced. It is this latter which is usually meant by "imagination" when we are speaking of art and literature and music; it implies not only the power of imaging, but also many other intellectual qualities, such as constructiveness and originality, together with certain emotional characteristics. Imagination is also

¹ "L'Année Psychologique," 1895, p. 20.

involved in scientific and practical pursuits. Not only is it necessary to be able to visualize clearly, but it is also necessary to be able to construct mental pictures of what we have never experienced. The internal behaviour of a biological organ, or the way in which a projected bridge will respond to a strain, or the kind of effect a given statement will make on a person, all this must be more or less constructively *imagined*, that is, put together out of previous images, under the guidance of experience. At the same time visualization is actually a hindrance to abstract thought, and Galton found that abstract thinkers do not as a rule picture to themselves.

The musician must of course have the gift of auditory imagination in a high degree. The ability to read an orchestral score, and reproduce all the tones and timbres of the different instruments, involves a remarkable power of reviving impressions in new combinations. Even to read and understand a novel or a biography requires auditory and visual imagination.

§ 4. Association of Ideas.

The laws of Association of Ideas occupy a large space in the works of most English psychologists, who attempt to explain nearly all the phenomena of mind by means of them. Thus according to such writers as Mill, Bain and Spencer, we associate thoughts and feelings when they occur in close connexion in time (Law of Contiguity) and when they resemble each other

(Law of Similarity). These laws hold, according to Mill, the same place in psychology that the law of gravitation does in astronomy. The tendency of modern psychology is to depose them from the supreme position thus given them, and to restore them to the place they originally held, *e.g.*, in the writings of Aristotle and Locke, as special laws of memory. For not all synthesis of presentations is association; and we must distinguish between (1) the revival of connected impressions in perception and (2) the revival of connected images and concepts in memory, reverie, thought, and other similar processes.

The former Ward proposes to call "Complication."¹ Here the reproduction is subconscious, immediate and instantaneous. In association it is fully conscious, and gradual; we proceed from one idea to another. In the one case there is one single act of attention; in the other a series of such acts. Ward contrasts the way in which the sight of a suit of polished armour reinstates what we have previously learnt of the hardness, coldness, and smoothness of steel, with the way in which it calls up ideas of tournaments, the crusades, and so forth. Association, properly so called, has place only between percepts already generalized, or ideas, or, as Bradley put it, "Association marries only universals."

At the same time, there is danger lest we should forget that after all the links which are woven be-

¹ Wundt also uses the word in a technical sense, but with a somewhat different meaning.

tween marginal presentations are at bottom of the same nature as those formed between general ideas. The synthesis which links into a whole the separate parts of a complex percept, so that one element recalls the whole, is really of the same nature as the Law of Red-integration mentioned in the next section.

§ 5. The Laws of Association.

Bain states the chief Laws of Association thus :

Law of Contiguity.—"Actions, sensations and states of feeling occurring together or in close succession, tend to grow together or cohere in such a way, that when any of them is afterwards presented to the mind, the others are apt to be brought up in idea."

Law of Similarity.—"Present actions, sensations, thoughts or emotions, tend to revive their *like* among previously occurring states."

Law of Compound Association.—"Past actions, sensations, thoughts or emotions, are recalled more easily when associated either through contiguity or similarity with more than one present object or impression."

On these statements, we may remark :

(i.) The laws do not properly apply to feelings, which are revived only through the relation of ideas; or to actions, which are not mental facts at all; or to mere sensations; but only to ideas and generalized percepts.

(ii.) The original state is perhaps never recalled

exactly as presented. It is revived in a form modified by the new context in which it appears. This is what Stout calls "relative suggestion."¹

(iii.) All actual association is probably compound. We never find one single presentation linked to another single presentation. The sight and smell and taste of a drug jointly help us to remember its name.

(iv.) Association is divergent as well as convergent. A given idea is linked to a thousand others. One particular kind of association we attend to, and reject the rest. The special interest, the end in view, determines which line we shall keep to, the others we regard as *obstructive associations*.

(v.) The laws of Contiguity and Similarity are not entirely distinct. The really effective bond is the bond of contiguity; the link of similarity is not a case of association at all. It is a case of the primitive process of assimilation. If the percept *a b y* revives the idea *a b x*, the identity of *a b* in the two cases is indeed recognized; but this recognition is not association. If the suit of armour makes me recall another suit of armour, it is because the *same* sensations are revived.

As a matter of fact, exactly the *same* sensations never are presented again. What we have presented are *similar* sensations. And hence we may adopt Höffding's language, that, "Every association by contiguity presupposes an association by similarity,

¹ "Analytic Psychology," ii. 51-65.

or at least an immediate recognition.”¹ If the percept x , now present, be not recognized as like the percept x which in the past was experienced with the percept y , x will not now revive y , in the form of a present idea y . If I do not recognize the thing in the corner as a suit of armour, I shall not think about tournaments and chivalry.

In any case it is clear that similarity by itself does not cause revival. If mere similarity revived, then, as Lotze argued, a tone or colour would call up other tones or colours in preference to any other percepts whatever.

The best statement of the law of association is that of Hamilton, which he calls the law of Redintegration: “Those thoughts suggest each other which had previously constituted parts of the same entire or total act of cognition.”² Höffding says admirably, “What really operates is the tendency to re-awaken the general state, or the general activity, to which all these ideas belonged. The innermost basis of all association of ideas should thus be looked for in the unity which is present in every mental state and every mental activity.”

Sir W. Hamilton enunciated a law of contrast, viz: “Things, thoughts, contrasted with each other, are mutually suggestive.” But this is obviously not an ultimate law. A does not revive X which has no kind of

¹ “Outlines of Psychology,” p. 157.

² “Lect. Metaph.,” ii. 238. Compare Höffding, “Outlines of Psychology,” p. 159.

similarity to it, but B, which has some points of resemblance and some of diversity. When we experience warmth, we do not think of a table or of a dog, because they are unlike warmth; we may think of cold, which has many more points of resemblance than of difference. It is a case of what Bain calls "similarity in diversity." The common part of the connotation is the bond: and the natural tendency to assimilation is fortified by the tendency to remember verbal antitheses—it is a special form of verbal adhesiveness.

(vi.) The laws of Association do not explain the whole processes of reasoning, memory, etc. This was pointed out by Coleridge: "Whereas Hartley fancied that our very reasoning was an aggregation, collected together under the law of association, on the contrary we reason by counteracting that law; just as, in leaping, the law of gravitation concerns that act in its latter part; but no leap could take place were it not by a counteraction of that law."¹ In the language of Professor Stout, "They presuppose the conative aspect of consciousness, and do not operate apart from it."²

(vii.) Even when voluntary attention is not counteracting the laws of association, "it is not true that the transitions of the mind from one topic to another are uniformly introduced by links of suggestion. When we are engaged on an interesting problem, and the train of our ideas is broken by the intrusion of

¹ See De Quincey, "Lake Poets" Works, ii. 115. Cf. Coleridge, "Biographia Literaria," p. 60.

² "Analytic Psychology," ii. 83.

other claims on our time and attention, our minds naturally revert to the original topic so soon as the interruption is over.”¹ Another instance, scarcely noticed by psychologists, is the way in which a tune that has impressed us, and sometimes a striking verbal phrase, will recur in season and out, sometimes for two or three days together, without any associative link being traceable between it and the percepts or ideas amidst which it intrudes.²

The two Mills, Bain, and other psychologists, have held that ideas may be so closely associated as to lose their own identity, and, like substances united in a chemical compound, give rise to an entirely new state resembling none of its constituents.

This law of Inseparable Association is exemplified, as they hold, in the case of (1) sensations, as when the seven prismatic colours are amalgamated, and white is produced ; (2) percepts, as when visual, muscular and other sensations are united to form the complex percept we call an object, independent and permanent, and localized, or projected, in space ; (3) concepts, as when mere regularity of succession gives us the concept of cause with its apparent necessity. In such cases of “ association ” the “ suggestions they produce are, for the time, irresistible ; ” and further, “ the suggested ideas (at least when the association is of the

¹ Stout, “ Analytic Psychology,” ii. 83.

² Perhaps it amounts to a slight and temporary derangement of attention—a mild “ *maladie de la volonté*.” Cf. the “ *idée fixe*.”

synchronous kind, as distinguished from the successive) become so blended together, that the compound result appears, to our consciousness, simple.”¹

This doctrine is, however, in some respects open to question. Waiving the point as to whether these are cases of true association, and not rather of a simpler type of synthesis, we see that in this so-called *mental chemistry* :—(1) the elements are often purely hypothetical. We cannot actually analyze a given percept of space into sensations of touch and vision and muscular movement, or the concept of cause into regularity of succession, and holding the constituents apart in the mind put them together again as a proof of the validity of our analysis. (2) In the case of sensations, where we can actually produce the given state (as *e.g.*, white light can be produced by mingling coloured lights) the synthesis may not be a mental one at all, but may be physiological. The nerve currents may be united, either in the peripheral organ or in the central organ.²

§ 6. Obliviscence.

We know that presentations not attended to lose their vividness; and that if not revived within a limited time they tend to be revived with more and

¹ Mill, “Examination of Hamilton,” chap. xiv., p. 316.

² Lotze, “Metaphysics,” (transl.) ii. 214; James, “Principles of Psychology,” i. 154.

more difficulty. At last we do not even recognize them when we meet them again.

This *Law of Obliviscence*, as it has been called, was referred to by Locke: "there seems," he says, "to be a constant decay of all our ideas, even of those which are struck deepest, and in minds the most retentive."¹

This law of obliviscence must not be regarded as an evil, or as a sign of mental feebleness. In the vast majority of instances, forgetfulness is only a necessary condition of mental health and growth. If nothing faded from our minds, if we only acquired and never forgot, mental life would be impossible. Half an hour's experience would suffice to drive us mad. Concentration of attention on the percept X, however, necessarily involves neglect of and forgetfulness of the percepts A, B, C; simply because our supply of mental energy is not infinite. Just as we cannot attend to all the objects in a room at once, so forgetfulness of the details of daily life is implied in study and devotion to professional pursuits. Fortunately the place of conscious perception is occupied by unconscious mental habits, except in abnormal cases of extreme "absentness of mind."

The presentation which begins to disappear the moment we cease to attend to it, goes on getting dimmer, passes beyond the field of attention, and becomes practically unconscious, as though it did not exist. With an effort we can still recall it. In a

¹ "Essay," bk. ii., chap. x., § 5. Compare above, chap. ii., § 6, for instances of obliviscence.

year's time a much greater effort will be needed ; in twenty years' time it will be, so far as we can see, wholly forgotten. Even then a sudden shock, or an attack of delirium, may bring it back into consciousness.

One important result of the law of obliviscence is that we tend to overlook signs to which we only give a modicum of attention and to remember only the things signified. This, as we have seen, has a most important bearing on the psychology of perception. And on the other hand, some obliviscence of the thing signified, as opposed to the sign, is essential in the higher region of abstract thought. Otherwise all symbolic reasoning would be impossible.

§ 7. Conditions of Revival.

The chief conditions of ready and accurate revival are :

(1) General power of retention, what Bain calls "natural adhesiveness."

(2) Repetition of the impression.

(3) Attention to the original impression or idea. Thus in a series of experiments, Benit and Henri found that foreign words were more easily remembered by children than native French.

(4) Nature of the impressions. Children, for instance, remember more easily objects seen than words heard or read.

(5) Nature of the impressions intervening between the percept or idea and the revival.

(6) Recent occurrence of the impression.

(7) Large number of associations, especially those connecting the impressions with one's general habits, professional interests, etc.

Adhesiveness diminishes with age, after a certain time. Probably after 25 most of us retain proper names with increasing difficulty. These go first. More attention is required, or more repetition, if we are to retain them. Even facts and statements are not so clearly remembered, unless they are closely connected with our main subjects of interest. This may be due in part to the crowding out of new ideas by the older ones ; the older ideas have much more interest for us, and they recur much more easily, owing to the fact of frequent repetition and to the fact that they are the survivors in a struggle for existence. Physiologically, this means that certain brain-paths are so worn by frequent usage, that only under special circumstances will they be deserted in favour of others.

If we attempt to recall a forgotten name we are dimly conscious of a blank to be supplied ; some features of the revived presentation immediately recur, we remember without effort, say, the appearance of the person and the place where he lives and the last business we had with him ; with more effort we recall other parts of the complex. We even remember the first letter of the name. The will is active ; we are acutely conscious of a baffled desire to complete this revival by remember-

ing the name; we instantly suppress any associations which would lead us too far away from the point we want to determine, and we keep our attention fixed on those associations which are most likely to prove serviceable. Brown was with us last time we met, and he hailed us both as we passed; he called loudly my name ———— and ———— Just at this point the attention lingers without result. We can get no further than the first letter.¹ We notice the uncomfortable feelings which accompany this effort, the sensation of strain in the head, the confusion, the anger, despondency, and even alarm, at first slight but rapidly increasing in volume if the task seems really beyond us.

In such cases there are many associated ideas, but none are so fully aroused as necessarily to drag the given idea into light. In some cases there seems to be an actual inhibition of the particular idea. Whatever else comes, this cannot. The facts of hypnotism and of mental disease go to show that it is possible for us to remember *negatively*, that is, to remember that we forget. A hypnotic patient, told that he cannot remember his name, fails to do so. The suggestion that we cannot find an object may prevent us from recognizing it on the table before us, although we should certainly perceive it, if the suggestion had not been made.

¹ The *first* letter because we pay more attention to this both in reading and in listening; after the first letter is apprehended we are apt to let our attention flag, as a name is not under ordinary circumstances an object interesting in itself.

All this time our thoughts hover round what James calls the "aching void." Mere association would lead them away, but the effort of will, determined by the special interest of the matter, that is, its recognized importance to us, inhibits such divergent trains.¹ At last of all the name comes with a flash of recognition. It comes and we know it is right. The recognition is due to the recall of other portions of the complex to which the name belongs. With the flash of recognition comes a wave of pleasant emotion; all sense of struggle and failure is obliterated, for the moment, by the consciousness of having filled up the "aching void," of having triumphed over a difficulty, and of being able to pursue the line of thought or conduct which was shut off from us by the gap in our knowledge.

§ 8. Physical Basis of Memory and Association.

The nature of the physiological accompaniment or basis of memory and association can only be guessed at. As usually stated, it is something of this sort. When a nervous discharge has taken place through a certain brain-track, a change is produced in the nerve-cells and fibres which form that track, and this renders the passage of a similar discharge more easy. The nervous molecules "acquire a greater or less degree of aptitude for submitting to disarrangement." If this is often repeated, the modification becomes relatively

¹ See p. 164, above.

permanent. No evidence exists as to the nature of the modification, which is probably beyond the reach of the microscope, or chemical reagents, or electrical tests. It is purely hypothetical; but its existence is inferred from psychological and physiological facts, and it is probable enough.

In fact it is only a special case of the general phenomenon of biological *habit*. The formation of such "functional dispositions" or "dynamical associations" involves not only a modification of a number of nerve cells and fibres, but a modification such that on the occurrence of a stimulus similar to that which originally produced the modification, the same nerve-cells and fibres will again act together. Some ideas recur more easily than others, because particular tracts are better organised and more easily permeable than others.

James points out that the mere fact that the original nerve-path was again active would not be sufficient basis for a recollection, even although consciousness accompanied its functioning. With the old nervous element, some others must be set in action, viz., those which answer to what he calls the "setting" of the past event—its concomitant circumstance, date, the presence of self, etc. Thus the "brain tracts excited by the event proper and those excited in its recall, are in part different from each other. . . . Wherever in fact the recalled event does appear without a definite setting, it is hard to distinguish it from a mere creation of fancy."¹

¹ "Principles of Psychology," i. 657-8.

CHAPTER IX.

THOUGHT.

§ 1. Logical and Psychological Analysis.

THE analysis of the logician does not profess to give us the actual processes which take place when inferences are made. His concepts, judgments, and syllogisms are not independent psychological realities. We do not first form concepts, then put together these concepts as judgments, and then again the judgments as inferences. They all appear in indeterminate forms. Thus, when a lady got into the omnibus the other day, I found myself mentally articulating, "Dyed hair!" Was this a concept, or a judgment, or an inference? It was in point of fact not precisely equivalent to any of the three.

The logical form "S is P" is the result of a special analysis conducted for a given object. It does not represent what is in our mind when we think; it is the form in which we have to represent our thoughts if we wish to make them perfectly clear in order to communicate them, or to test them. If I want to do either, I must say, "That lady's hair is dyed," or something equivalent. But the actual process of

thought does not often take the shape which the logician calls a judgment, any more than it does the form that he calls a concept, or that he calls a syllogism.

Thinking is not mere association of ideas. It involves a cognitive synthesis; the subject and predicate must be bound together in one act of apprehension. But this is preceded by an act of analysis—the predicate must be clearly distinguished from the subject in which it was previously implicitly apprehended. A dim and confused apprehension of the lady's dyed hair preceded my analysis into hair and the act of dyeing. Whether I make the judgment "the hair is dyed," and thus keep the two ideas distinct even while I assert their union, or whether I unite the whole into a closer and more complex idea, "dyed hair;" there is first analysis of an undifferentiated whole, and then synthesis of the discriminated elements.

In all thinking, whether conceptual or propositional, we always have comparison, the attempt to discover relations of likeness or unlikeness between objects. "The process itself involves a peculiar transitive movement of attention from one object of comparison to the other; the peculiarity of this mental transition is that attention remains as far as possible fixed on A in the very act of fixing it on B. In all relatively complex cases there is a backward and forward movement of thought; attention is concentrated first on A, then on B, then again on A, and so forth. . . As the result of this process there emerges an apprehension of agreement

and difference, together with a more or less sharp distinction between the points in which the objects agree, and the points in which they differ.”¹

§ 2. Conception and Imagination.

We must distinguish between the static and the dynamic sense of the term concept. Looked at as a mere presentation, occupying the focus of attention for an instant, the concept has affinities with the image. But in its actual usage, in the very work of thinking, this presentation-aspect is of the smallest importance, and the dynamical relations are of the highest.

The term concept, or notion, is used to denote all ideas of a generic character, from those which are little more than images to those in which the presentation-element is entirely overlaid by non-presentation and relational elements. It means what Locke calls an “abstract idea.”

When viewed at rest, the more concrete concepts are barely distinguishable from images. No image is perfectly individualized. “Our ideas of single objects and circumstances which have been presented more than once in our experience are abstract, quite as much as general ideas proper,” says Hoffding.² The superposition of one percept on another produces the same kind of blurred image as the superposition of one

¹ Stout, “Analytic Psychology,” ii. 168-9.

² “Outlines of Psychology,” p. 166. Cf. Stout, “Every image is a generic image.” (“Analytic Psychology,” ii. 34.)

photograph on another, when what is called a "composite portrait" is produced. Thus one's mental picture of one's brother's face may be less definite and clear, though infinitely more characteristic, than is that of a stranger with great visualizing power, who has seen him only once.

Our image of an Englishman, or of a man in general, is necessarily less precise. It wavers from instant to instant, because we must not dwell on those features which are individual or special. By concentrating our attention on those elements which are essential, we glide over those which are less important; but if we attempt to visualize the image fully, we know that it loses much of its generic character. A true generic image of a triangle cannot be got, but we can begin to draw one on our mental blackboard, until the need to negate the specific forms (equilateral, isosceles, scalene) comes to check us. In the case of more complex images we can go further before we have to rub out some specific features. We are conscious that the image which rises when we read that "A new church has been built at X," is not an individual image, but a typical one: that round the image there are features we cannot represent. These marginal and sub-conscious elements form what James calls a "psychic fringe."

Such a generic image is, however, not a concept, though it is very near to one. In the true concept the presentative element is only a centre from which the relations that constitute its real meaning radiate,

and on which they rest. When we think about a man, or a dog, or a church, we do not dwell on the image, and it never remains in the centre of attention as an image. The presentative part is a mere symbol for what cannot in its essence be represented, the relations which are known but cannot be pictured. The "fringe" is more important than the more clearly presented portion.

Yet some presentative element is necessary if the relation is to remain in the focus of attention at all. The older psychologists spoke as though the only alternative was between no representation at all and a complete image. But introspection shows us that in the actual work of thinking the image is never completed; it is schematic. In this way the imperfect or diagrammatic type of generic image referred to above often serves to form the presentation-basis of the concept.

But the presentation-basis may be a visual image of the printed or written word; or the auditory-motor image of the uttered word. Careful inquiry shows that in reference to conception there are three principal types of minds; there are persons who habitually see a visual image of the thing named; others who habitually have a visual image of the word; others again who have an auditory-motor image of the spoken word.¹ This serves as the presentation before con-

¹ Hypnotic experiments conducted by Wizel go to show that even when there appears to be no conceptional image before the mind there may be one. Cf. also "Proceedings of the Congress of Experimental Psychology," London, 1892, pp. 20-3.

sciousness; the counter which we use, not for its own sake, but because it symbolizes something.

Different types of symbols, then, are at hand for most people, and they use them for different kinds of subjects. Thus, Professor Sidgwick found he used the concrete visual image when thinking on economic subjects, and the printed-word image in logical and methodological reasoning.¹ The degree of filling up of the image (concrete or verbal) will vary with the power of visualization and with the subject matter. When we deal with very abstract concepts, only verbal symbols will be employed by most people. Thus I do not form any concrete image when I think of the progress of democracy, or the law of continuity. The verbal image is a much more effective basis for the concept, because it is (1) so much more definite, and (2) so much easier both to reinstate and to dismiss.

§ 3. Apprehension of Relations.

What is a relation? The thing itself is absolutely undefinable, though everybody knows what it means. Relations form the very essence of our knowledge—

¹ Dr. Sidgwick found that the concrete images he employed when reasoning on Political Economy were "often curiously arbitrary and sometimes almost undecipherably symbolic. For example, it took him a long time to discover that an odd symbolic image which accompanied the word value was a faint partial image of a man putting something in a scale" (*op. cit.* p. 24).

what we *mean* by knowledge. I may continue to see two pieces of paper in front of me, but no knowledge consciously arises unless I unite them in one in an apprehensive relation, "This is the same colour as that," or "That is larger than this." This relation of identity, or of relative size, cannot itself be represented. The two terms can and must be represented if I am to understand the relation, but the relation itself cannot. All I can do is to reproduce the terms, and go through the same mental movement again. This mental movement leaves some kind of trace, which Lotze calls an idea, and James a feeling. But neither word is adequate. The so-called "idea" of identity has no presentative content. Nor can the apprehension of a relation be made clearer by dwelling on it, but only by dwelling on its terms. It is essentially transitive. On the other hand, the term "feeling" is not applicable, because the apprehension of relation is essentially cognitive, and not emotive; it has no direct reference to pleasure or pain.

The relation may be implicitly apprehended by the mind without being apprehended as a relation. This is what Professor Lloyd Morgan terms "sensing the relation," and this is the only relationing which he will allow to occur in animals and very young children. The dog turns his eyes from one lump of meat to another, and perceives that one is bigger than the other. The two impressions successively occupy the focus of his attention; but he has no interest in the transition. It remains subconscious, or at any rate

“marginal.” The transition does not become a relation unless it is apperceived or focussed. And this, in all probability, is what never happens, at any rate in the case of the dog.

In the case of adult human beings, most psychologists seem to hold that the relation may actually occupy the focus of attention; in other words, may become a presentation. Lloyd Morgan puts the matter in these words:—“Every relation involves two related terms; until the second term is given, the relation is incomplete; but at the moment of passage from the first to the second, the latter is not yet given. Hence it is impossible to sense a relation in its completeness during the transition which is its psychological equivalent.”¹ But by going back, by retrospection, we can, he thinks, bring the relation itself into the focus. Let *a*, *b*, *c*, *d*, *e*, represent the series of ideas occupying the focus of attention. The transition *a*—*b* gives us a relation, but only a “marginal awareness” of it; if we go back and look at this transition, we have a clear idea of the relation itself which holds between *a* and *b*. He maintains that we can thus bring the relation into the fullest focal consciousness.

This, however, seems to me impossible. So far as introspection shows me, I never bring the relation itself into the focus of attention, though I do bring there either (1) the visual or auditory-motor verbal

¹ “Introduction to Comparative Psychology,” p. 225.

image (*e.g.* "same," "different," "larger,") or (2) the successive images of the two objects I wish to compare, quickened by the consciousness that I am comparing them.

This opinion is no doubt paradoxical. Relation is everywhere implied in knowledge; indeed it is of the very essence of knowledge that we apprehend the relations between our presentations. And yet introspection seems to show that this element is just the one which never comes fully and definitely before the mind; that it always remains implicit and never becomes explicit as a presentation.

§ 4. Nominalism and Conceptualism.

During the middle ages one of the questions most keenly debated by the earlier Schoolmen was that as to the nature of universals. Two doctrines were originally put forward, Realism and Nominalism. Realism, of which perhaps the first explicit teacher was John Scotus Erigena who died about 877, taught that what we now call the connotation of general terms has a real and independent existence; that therefore universals or generals (*e.g.* Humanity, Caninity) really exist as abstract but actual entities both in and before the individual objects, (*e.g.* John, Peter, James; my dog, your dog, etc.) Realists called them *universalia ante rem*, and held that they exist in the mind of God not as thoughts but as real, though of course immaterial things, and that the existence

of each concrete man or dog depends on its participation in the abstract reality. This doctrine is of course an extravagant form of the teaching of Plato. The more moderate Realists, however, approached nearer to the position taken by Aristotle in opposition to Plato; namely, that the universals, though real entities, exist only *in re* and not *ante rem*. This was the doctrine held by some of the greatest of the Schoolmen, such as St. Thomas Aquinas.

In opposition to Realism, Roscellinus, a canon of Compiègne at the end of the eleventh century, taught the doctrine that the only universal is the name itself. The *name*, dog, is applicable to many dogs; but there is no kind of entity answering to it, whether existent in the mind of God *ante rem*, or existent in the individual human mind. As St. Anselm said, the question at issue is, whether the words man and humanity, are properly applicable to any actual entity except individual men. The Realists said Yes; the Nominalists said No.

A more moderate form of Nominalism was advanced by William of Occam, the great English Franciscan (died 1347). The universal exists in the thinking mind as a concept, signifying several singulars; but outside the thinking mind, the only general is the name which serves to indicate the several singulars. He agreed with other Nominalists that there was no independent entity answering to humanity which could exist apart from the individual man; but he disagreed with those extreme Nominalists who held that every

idea was an individual one and that only the name was general.

The dispute begins as a metaphysical question, Are general entities possible, and if so in what form do they exist? In the course of time, it became a psychological question, Have we any general ideas (concepts), or are names the only universals? The old Realism disappeared from philosophy, though retained by theology: and the more modern schools, representing the two wings of the old Nominalism, fought out the question in this new form. Hobbes for instance held that "there is nothing universal but names"; while Locke held that we have the power of forming general ideas by abstraction. Among more recent writers Bain may be regarded as the last of the Ultra-Nominalists; he holds that "the only generality possessing independent existence is the name," for "general ideas have no mental existence."¹ The moderate Nominalists, who maintain that some sort of general representation is possible, are now called Conceptualists.

The Ultra-Nominalists urge that a general representation is impossible. I may picture to myself an individual horse and regard it as a type of a whole class; but I can never form an idea of a horse in general. If I imagine a triangle it must be either equilateral, isosceles, or scalene; I cannot conceive of a triangle in general, which is not any of the three.

¹ "Mental Science," p. 180.

This argument, however, seems to confound two distinct things—imagination and conception. It is quite true that I can only *imagine* (or picture to myself) individuals; but this does not show that I cannot *conceive* anything but individuals.

Mill's view is that "we have a concrete representation, certain of the component elements of which are distinguished by a mark designating them for special attention [*i.e.*, the class-name]; and this attention, in cases of exceptional intensity, excludes all consciousness of the others." "While the concentration of attention actually lasts, if it is sufficiently intense, we may be temporarily unconscious of any of the other attributes and may really, for a brief interval, have nothing present to our mind, but the attributes constituent of the concept."¹ We have only to omit the words which ascribe infrequency and momentariness, and this becomes a very fair statement of the Conceptualist view in its more moderate form.

But it is defective in not laying enough stress on the unrepresentable part of the concept. It is true that in a concept some representable features of an image are missing; but it is also true that a concept contains some features which cannot be represented in any image. We must remember that besides concrete concepts, like *dog*, *man*, etc., there are other highly abstract ones, such as *ecclesiastical organization*, *interaction of biological functions*, and so on, which have

¹ "Exam. Ham.," pp. 396, 393.

very little presentational basis, and whose meaning is almost entirely a matter of relations. As a rule, they belong to the verbal type, and if any visual image is retained it is retained in a symbolical form, like the presentation-element in Professor Sidgwick's concept of value.

§ 5. Language.

The relations between thought and language are very close. The two constantly react on each other, and can hardly exist apart. It seems equally true to say that there can be no thought without language, and that there can be no language without thought. From the point of view of the race, however, there can be little doubt that the needs of recording and communicating elementary thoughts, feelings, and desires, led to the development of language ; and that the possession of language led to the further development of thought.

Even what we shall *perceive* is to some extent pre-arranged by the character of the language we speak. Accurate description is not only the effect of accurate observation, but the cause of it. The existence of descriptive terminology shows us what we are to look for.

Much more even than our percepts are our concepts formed under the direction of language. We group and hold together just those attributes which we are directed to hold together by the use of names. To teach a name, if the name is taught properly, is to commu-

nicate a thought; and to communicate a thought, if the thought is correct, is to communicate a knowledge of things. Here again the absence of words of wide general meaning, which has been so often noticed among savages, is not only the effect, but the cause of ignorance.

Sir W. Hamilton, in a passage frequently quoted, compares language to the arch with which engineers secure the results of their excavations. "Language is to the mind precisely what the arch is to the tunnel. The power of thinking and the power of excavation are not dependent on the word in one case, or the mason-work in the other: but without these subsidiaries neither process could be carried on beyond its rudimentary commencement."¹

By language, in the psychologist's sense of the word, we mean any system of symbols used for the expression and assistance of thought. These symbols may be oral, visual, tactual, or motor. Oral symbols are spoken words, which, it must be remembered, appeal not only to the ear, but to the motor or muscular sense. With the sound is revived a faint image of the laryngeal and other strains which accompany the utterance of the word. If this image is imperfectly individualized the word is badly remembered. Thus I have noticed that children who have a difficulty of utterance (due, *e.g.*, to malformation of the vocal organs, or to polypus) seldom spell well, even when their ear for music is quite up to the average.

¹ "Lect. on Logic," i. 138 *sq.*

For the normal infant or the savage a word is a mixture of auditory elements and motor elements. With the normal educated adult the word-image (or verbal idea) contains as well as the auditory-motor image, a visual element, that is, an image of the printed or written word. The educated blind manage without this, adding, perhaps, an image of the motor-sensations required to write a word, or trace it on the embossed books used by them. The educated deaf are without the auditory element, and have only the visual and motor. In normal persons sometimes the visual element (printed word), sometimes the auditory-motor element, is prominent.

When a normal baby first learns his own language he learns (1) to associate sounds with motor-sensations of articulation, (2) to associate both of them with percepts, (3) to associate both of them with concepts. At the same time he acquires fresh percepts and concepts as a part of the process of acquiring the sounds and the power to utter them. The additional attention given to the percept "Dada" by the pleasure derived from the utterance of the word, helps him to identify "Dada." Most words he uses at first with very little apprehension of their meaning; and the association between the verbal idea and the thing signified grows up gradually after many failures. By applying the same word "Dada" to various men, he gains a rudimentary concept of *man*; and this again illustrates the educational effect of language.

(1) The use of symbols, that is, of language, enables

us to fix and hold together a group of ideas. The whole connotation of the word is implied when we use a name; and we can at any moment refer to memory or to other sources of help to render explicit what we have been implying. It keeps the entire group firmly united, for purposes of record and communication to others. This is its *static* use. The definite, clear-cut verbal idea makes up for the indistinctness of the image, and the incoherence of the connotation. The very abstract concepts lately spoken of, where no concrete image is possible, could never have been formed apart from language, which enables us to hold together "in a coherent system, though not in a single image, the relations which make up the content of our thought."

(2) It also facilitates the actual movement of thought. This is its *dynamic* use. It enables us to wield the whole group of elements easily. Just as a mathematician substitutes a single letter like Σ for a complicated expression, and henceforward uses the former for the latter, with the effect of making his processes simpler, easier, and less liable to error, so we use the name instead of its connotation. Thus an enormous economy of time and effort is effected.

Words are, however, not merely like the x and y of algebra. They are not mere counters or substitutes, which may be used without our understanding them. This difference is somewhat paradoxically expressed in the following words:—"A word is an instrument for thinking about the meaning which it expresses; a

substitute sign is a means of *not* thinking about the meaning which it symbolizes.”¹

The definiteness of verbal ideas, their threefold character (auditory, motor, visual) and the pleasures of utterance, help to make verbal trains particularly easy to reproduce and manipulate. Verbal adhesiveness, as Bain calls it, is much stronger in some persons than others, but it is usually stronger than other kinds of adhesiveness. The existence of the multiplication-table, and of various kinds of *memoria technica*, is due to this. Many adults still remember the number of days in the several months of the year by the jingle “Thirty days hath September,” etc. A word-image is as effective in reviving its meaning as a sensation is in reviving the rest of the perceptual group; but to this advantage is added another. Whereas the percept when revived tends to bring into consciousness contiguous presentations, the verbal image is free from almost all associations except its meaning.²

§ 6. Abstraction, Generalization, etc.

Abstraction, generalization, classification, and conception are different aspects of the same process. To form the idea of a class involves the recognition of a number of related attributes, exhibited by individuals whom we include in the class; and we arrive at these

¹ Stout, “Analytic Psychology,” ii. 194. ² *Ibid.*, ii. 194, *sq.*

separate attributes by abstraction. To think of a property by itself, apart from other properties and from the thing to which all belong, is abstraction, and it is an act implicitly involving classification or generalization.

The formation of a class implies, in turn, an act of abstraction. All concepts, even of the more concrete type (*e.g.* man, dog), are abstract, though not all names of concepts are abstract terms.¹ In all concepts some part of the fact we apprehend in the individual percept is disregarded. But those are specially called abstract which leave out of sight those more obvious attributes, of special interest in practical life, which go to make up our concrete representation of an object. Thus the concepts of Geometry or Logic are called abstract in this limited and emphatic sense.

§ 7. Judgment and Reasoning.

The logician thinks of judgment as the formal synthesis of two fully-determined concepts. The psychologist cannot make any clear distinction between judgment and conception. He sees in judgment rather the process of forming a concept, in which a concept at present relatively unsatisfactory is permanently or temporarily enlarged by the addition of some fresh feature.

The general opinion of psychologists seems to be in

¹ Ryland, "Logic," pp. 23-24.

favour of regarding judgment as a more elementary exercise of thought than conception. "Psychologically—that is to say, chronologically—the judgment is first," says Ward.¹ We begin, he thinks, with impersonal judgments; thus the child would discriminate between the man and the statue by thinking "It moves," "It speaks," where *it* indicates the percept, or the generic image, a mere "starting point for predication."

We may, then, regard a judgment as an arrested phase in the formation of a concept, a process made fixed and permanent, and as it were petrified. For purposes of regulating our thoughts this intermediate state is of more importance than the starting point and resting point of perception or conception. Hence the logician is specially interested in it.

In every thought-process, as distinguished from mere association, there is analysis, and synthesis of the elements obtained by analysis. Both analysis and synthesis involve a clear consciousness of the *relations* which exist between the parts of the mental content and between the whole and other concepts analyzed. In mere association (or reverie) these features are absent. If I am not thinking but only letting my ideas wander, the concept of *freedom* suggests shrieking and Kosciusko by a mere verbal association, due to my remembrance of Campbell's line; when I *think* about freedom my attention indeed passes on to fresh ideas, but

¹ Article "Psychology," p. 78. (The example is my own.)

by a different process. I split up the connotation of the concept, keep its elements before my mind, and see what they involve; that is, I attend to the relations of likeness or unlikeness, causality, etc., which hold between the parts so analyzed, and between any of these and other concepts floating in the marginal region of consciousness. Hints for such analysis may be often given by mere verbal association, or other non-logical suggestion; but all suggestions which do not serve the purpose of elucidating the nature of the concept are at once inhibited, while those which are connected with the central point of interest arouse vivid attention. Herein we see the principal part played by will in thinking.¹

Dr. Ward's account of the process may be herewith added. "Thinking may be broadly described as solving a problem—finding an A X that is B. In so doing we start from a comparatively fixed central idea or intuition [perception] and work along the several diverging lines of ideas associated with it. . . . Emotional excitement—and at the outset the natural man does not think much in cold blood—quickens the flow of ideas; what seems relevant is at once contemplated more closely, while what seems irrelevant awakens little interest and receives little attention."²

In the judgment, as fully expressed, the subject and predicate remain apart; the synthesis is not yet complete, for even as we assert that "S is P" we dis-

¹ See below, chap. xii., § 6.

² Article "Psychology," p. 75.

criminate P from S. There is analysis as well as synthesis when the child thinks "that man is Dada," "this horse is red."

§ 8. Inference and Intuition.

Judgments are arrived at sometimes by inference and sometimes by less clearly distinguishable processes. By inference we properly mean the process of arriving at a new judgment from data which we can distinctly formulate; the relation between the judgments being such that if the data are correct, the new judgment is necessarily true. It is distinguished from mere association on the one hand, and from intuition on the other.

Intuition is direct or immediate knowledge; cognition which takes place without involving any other object than that actually cognized. Whether such a thing as absolute intuition exists is open to question. As we have seen, the perception of external objects is not a case of pure intuition, though it is often called intuition. It is a highly complex process, involving features which render it so nearly allied to inference that the name has often been applied to it.¹ "I affirm that I saw my brother at a certain hour this morning. If any proposition concerning a matter of fact would commonly be said to be known by the direct testimony of the senses, this surely would be so. The truth,

¹ See above, chap. vi., § 1.

however, is, far otherwise. I only saw a certain coloured surface ; or rather, I had the kind of visual sensations which are usually produced by a coloured surface ; and from these as marks, known to be such by previous experience, I concluded that I saw my brother. I might have had sensations precisely similar when my brother was not there. I might have seen some other person so nearly resembling him in appearance, as, at the distance, and with the degree of attention which I bestowed, to be mistaken for him. I might have been asleep, and have dreamed that I saw him ; or in a state of nervous disorder, which brought his image before me in a waking hallucination. In all these modes, many have been led to believe that they saw persons well known to them, who were dead or far distant. If any of these suppositions had been true, the affirmation that I saw my brother would have been erroneous ; but whatever was matter of direct perception, namely, the visual sensations, would have been real. The inference only would have been ill grounded.”¹

We may go further. To classify a sensation of sight as “ white ” is an inference, if we use the term in the wide sense just mentioned ; it is an act of representative cognition involving other elements besides the actual sensation itself, to which it is related, and thus known as similar or different. In the same way all localization of sensations involves subconscious in-

¹ Mill, “ Logic,” ii. 186, iv., i. § 2.

ference. Indeed, to recognise a given state of consciousness as a sensation at all is an act involving inference; we must discriminate the sensation from other states of consciousness (*e.g.*, emotions, thoughts), and bring it into relation with previously experienced modes of feeling which it resembles.

The term intuition is often used to cover those cases in which some general truth is accepted on its own evidence, cases in which there appears to be direct knowledge of the validity of a universal proposition, without the help of explicit thought. Thus philosophers have insisted that the acceptance of certain truths in Mathematics, Metaphysics, and Ethics rests on a process of immediate knowledge, sometimes called *rational intuition*. For instance, Professor Calderwood says: "The recognition of general truths or principles is perception or intuition of a higher order, as the recognition of simple fact is perception or intuition of a lower order. Knowledge of the former kind implies direct insight into necessary truths. The possibility of such insight is the highest characteristic of our intelligent nature." As examples of mathematical intuition we may take the axioms of Geometry; as examples of metaphysical intuition, the principle of Sufficient Reason and the Laws of Thought; as examples of ethical intuition, the Golden Rule and the Bindingness of Duty.

Most of these apparent intuitions are, however, rather principles necessarily assumed to be true in order to justify the validity of our conclusions, than

principles independently and directly seen to be true. We are obliged to assume some truths as ultimate, because we want starting-points for our inferences. In other words, since the word intuition is antithetically opposed to inference, it is sometimes used to denote both (1) what is or appears to be immediately apprehended, and (2) what is assumed without proof as an ultimate datum of knowledge.

Whether or not absolutely immediate knowledge exists is open to question ; but undoubtedly a great deal of knowledge appears to be immediate. Thus we may call the apprehension of the fact that two straight lines cannot enclose a space an intuition, meaning that it is due to the apprehension of the necessary relations which straight lines bear to each other, without any process of reasoning being detectable. The rapid judgments of the practical man, the artist, and the soldier are in the same way often called intuitions, because the bases on which they rest cannot be adequately set out in propositions.

To sum up, Intuition appears to be used in four allied senses: for (1) immediate knowledge as of certain spatial relations ; (2) formation of judgments from data which cannot be clearly discriminated ; (3) ordinary perception ; (4) acceptance of principles which cannot be themselves demonstrated, but which appear to be necessary if the general fabric of our knowledge is to be justified.

The term "intuition," it must be borne in mind, has in itself nothing to do with the term "innate."

In some sense every faculty of our mind and body is innate ; while nearly every faculty requires exercise and cultivation, otherwise the faculty remains a mere potentiality. Perception, thought, and conscience, are just as much and just as little innate as walking or talking.¹

¹ See chap. iii. § 5.

CHAPTER X.

TIME AND SELF.

§ 1. The Psychological Treatment of Time.

WE refer our percepts to things existing in space ; that is, when we experience certain visual and actual sensations, we assume that we are in the presence of something which we describe as occupying space. Our concepts and images we do not refer to space, but we recognise that they occur in time. This does not mean that they do not exist simultaneously and along with each other, but only occur one after another. As a matter of fact our ideas have a certain degree of simultaneity. But they have none of those special kinds of simultaneity which we call space-relations ; relations which are absolutely *sui generis*.

Just as the psychologist has nothing to do with the ultimate nature of space, so he has nothing to do with the ultimate nature of time. He assumes them both to be real, just as the astronomer or the geologist does, and leaves to the metaphysician the business of criticizing the assumption. But he has the business of trying to show how we come to locate our percepts in space, and our ideas in time. He has to trace the

steps by which the child comes to perceive objects as near or far off, big or little, and so on ; and how he comes to know what to-day, and yesterday, and to-morrow mean, and to discriminate the memory of what he did yesterday from the memory of what he did a month ago.

§ 2. Apprehension of Time-Relations.

At first sight it might appear that our knowledge of time-relations is intuitive, and so some of the Associationist psychologists appear to have assumed. But the mere occurrence of a succession of ideas *a, b, c* would be unable to give us any knowledge of *a, b, c* as a *succession*, unless these ideas were apprehended as by one and the same subject in a certain relation to each other and to itself. Locke was correct when he said that it was our "*reflection* on these appearances of several ideas one after another in our minds" which "furnishes us with the idea of succession."¹ In Dr. Ward's words, we must distinguish between a succession of percepts and a perception of succession.

We have just noticed that we do not find in the mind an absolutely serial arrangement of states of consciousness. Mere protension without simultaneity does not exist, any more than length without breadth in the physical world. However distinct may be the series of focal states, they are accompanied by and

¹ "Essay," bk. ii., chap. xiv. § 1.

connected with a slowly moving background of marginal or subconscious presentations. These include the dim, constant, seldom-changing organic sensations, which as a rule become distinct only when they rise to a painful degree of intensity.

(1) The first dim apprehension of time thus arises for the infant through the recognized difference between what is relatively constant (the organic sensations) and the fleeting sensations which come and go, and occasionally alternate. The pin-prick comes and goes ; so does the pang of hunger ; so does the dazzling light ; but the dim background of systemic consciousness, which forms the content of the original idea of self, remains. There is consciousness of change and alternation.

It has not, I think, been remarked that the rhythmical stimulation with which we amuse children must help to develop this elementary apprehension of time (for instance, tickling, "peep-bo," bobbing up and down, etc.). The pleasurable expectation of the recurrence of a rhythm is especially important, as a stimulus to make us attend to the difference between the permanent and the transitory.

(2) Let us call two percepts *a* and *b*, and suppose they are recognized as different and the first apprehension of rhythm is set up. The next step is the insertion of intermediate percepts *m* and *n*, less intense so as not to distract attention from *a* and *b*. "There will thus be found a firm connection, *a*, *m*, *n*, *b*, and a rhythmical alternation takes place which becomes gradually

familiar to consciousness and easily surveyed.”¹ This same time-space may be filled up differently. Thus we may have a, p, q, b ; and also c, m, n, d , and c, p, q, d .

In this way we rise to the first feeble recognition of what is afterwards the abstract concept of time, not as any particular series of presentations, but as the formal possibility of various arrangements of presentations. The element of generalization has been introduced, and we have got beyond the stage of merely “sensing the relation.”

(3) Side by side with experience of succession comes that of *duration*, that is, of the amount of time occupied by a presentation or series of presentations. This begins by the recognition of the varying length of intervals. A succession of six strokes of the clock lasts longer than a succession of three. One whistle lasts longer than another. More dim presentations flow by before it comes to an end. If some special pleasure arises in connection with it, we shall attend to this well-marked difference.

(4) The next step is the discovery of the difference between the present, the future, and the past. We begin with the now and the not-now; and the not-now resolves itself into the future and the past. At first the child does not distinguish between the percept and the image. Later on he recognizes that the image represents something not here-and-now; later still he distinguishes between those images which bring with

¹ Höfding, “Outlines of Psychology,” p. 185.

them a fixed set of other images, and therefore the dim apprehension of having been in our minds before, and those that do not bring any such fixed group. This lays the foundation of the distinction between memory and mere imagination.

Note that the "sensible present" is not a mere point. It has a duration of a second or two, and is not quite the same thing as the abstract present, an absolute mathematical point.

§ 3. Time and Memory.

Such are the chief phases in the early development of the idea of time, as perceived and as conceived. How do we come (1) to locate events properly in time, and (2) to estimate intervals of time rightly?

We have seen that when an image is accompanied by *other images*, viz., those of presentations which occurred at the same time, we have memory as opposed to mere imagination. How can those images now present simultaneously be interpreted as having occurred in succession?

Localization of remembered events in time, Dr. Ward urges, is due to:—(1) "Traces of that movement of attention of which we are aware in passing from one presentation to another." These (hypothetical) residua he calls "temporal signs;" and he thinks there is strong indirect evidence of their existence in the fact that we most easily follow a series of remembered events in the order in which they originally occurred

so us. (2) "The working of obliviscence, by insuring a progressive variation in intensity and distinctness as we pass from one member of the series to the other, yields the effect which we call time-distance"¹—just as we get what is called aerial perspective in regard to space.

There is a marked difference between our apprehension of space and of time. The knowledge of space is mainly perceptive; we can take in as an object of sight a great number of inches or even of yards, and have not consciously to build up our cognition. To misapply a line of Matthew Arnold's, "we see it steadily and see it whole." But the cognition of an interval of time, of even a few minutes, we have to put together as best we can as an aggregate of small time-impressions. "The durations we have principally to do with—minutes, hours and days—have to be symbolically conceived and constructed by mental addition, after the fashion of those extents of hundreds of miles and upwards which in the field of space are beyond the range of most men's practical interests altogether. To 'realize' a quarter of a mile we need only look out of the window and *feel* its length by an act which, though it may in part result from organized associations, yet seems immediately performed. To realize an hour, we must count 'now! now! now! now! now!' indefinitely. Each 'now' is the feeling [apprehension] of a separate *bit* of time, and the exact

¹ Article "Psychology," p. 65.

sum of the bits never makes a very clear impression on our mind."¹

Hence our subjective estimates of time are seldom correct. They depend not only on the number of presentations which have intervened, but also on the degree of attention excited by them. Thus it has been recently shown that the passage of a band of uniform colour seen through an orifice appears to take a longer time than the passage of a band of variegated colours, which actually occupies the same time; and that a series of meaningless syllables or of unrelated sounds will appear longer than a series of words having a connected meaning.² In the last case, attention is fixed on the import of the words, and we have no longer a series of separate and distinct ideas successively brought into the focus of attention.

Vierordt and other experimenters have shown that we over-estimate very small intervals of time and under-estimate greater ones. The most favourable results are obtained at about $\cdot 7$ to $\cdot 8$ of a second.

Münsterberg thinks that muscular sensations are those by which we measure small time intervals. This is the more probable since there is great reason to think that our sense of rhythm is due to muscular, or at any rate motor, sensations.³

¹ James, "Principles of Psychology," i. 611.

² Experiments by Münsterberg and Wylie.

³ See James, "Principles of Psychology," i. 620-1; and compare Bolton's experiments given in "L'Année Psychologique," 1895, pp. 364-5.

By whatever subjective process we guess the length of time-intervals, the result is usually inaccurate: though specially gifted persons, and persons in abnormal conditions (*e.g.*, hypnotic patients), sometimes estimate such intervals with extraordinary acuteness.

Hence arises the need of objective time-measures. We measure the amount of space traversed in a given time by something having uniform motion, in preference to directly estimating time-intervals. As Spencer remarks, we express Time in terms of Space, and at last think of spaces on the watch face without troubling to render them into the periods they stand for.¹ The one becomes the complete symbolic substitute for the other.

§ 4. The Idea of Self.

We must bear in mind the distinction, first clearly made by Kant,² though it may be found in Leibnitz,³ between (1) the pure subject of all experience, the knowing self which metaphysicians postulate to explain the nature of knowledge; and (2) the empirical self, the actual self known to each of us, which is as much an object of knowledge to the pure self as is the outside world itself.⁴

(1) With the first sense of the term the psychologist

¹ "Principles of Psychology," ii. 208.

² Kant, Critique of Pure Reason, Meiklejohn's translation, p. 239 *sq.*

³ Leibnitz, "Nouveaux Essais," ii. § 9.

⁴ See above, chap. ii., § 3.

has little to do ; although it seems that, like the metaphysician, he has to assume the existence of such a knowing subject, in order to describe his phenomena intelligibly. Just as physical science assumes the reality of matter, so psychology assumes the reality of the knowing mind, to which all the concrete phenomena of consciousness belong. Dr. Ward urges that the conception may be kept as free from metaphysical implications as the conception of the biological individual or organism with which it is so intimately connected.¹

The arguments then in favour of the assumption are (a) that the facts of consciousness can be all expressed (not explained) by assuming it ; (b) that no account which refuses to recognize the psychological subject will hold together. Thus we cannot speak of mind as simply a "series of states of consciousness ;" we must imply that somebody or something is aware of them, that they exist for some subject. In the words of J. S. Mill : " If we speak of the Mind as a series of feelings, we are obliged to complete the statement by calling it a series of feelings which is aware of itself as past and future ; and we are reduced to the alternative of believing that the Mind or Ego is something different from any series of feelings or possibilities of them, or of accepting the paradox, that something which *ex hypothesi* is but a series of feelings, can be aware of itself as a series."²

¹ Article " Psychology," p. 39.

² Mill, " Examination of Hamilton," chap. xii.

(2) By the empirical self we mean the group of phenomena which we recognize as self. Our experiences arrange themselves in two main groups, one or both of which may be before our attention at the same time : (i) the train of percepts, which may be interrupted for a time, but which may be, as a rule, reinstated, and (ii.) the train of ideas, feelings and volitions, which is less coherent and less definite than the first. We in part regard the latter as dependent on the former ; to the former we attribute a basis outside the other group, and independent of it. We assume that if *I myself* lapsed into nothingness, the world would remain as before.

It is to this empirical self that we attribute identity; it is for this that each of us cares.

A self in this sense is a concrete thing, a group of presentations and ideas which has somehow grown into existence, and of which we are aware. Sometimes one part, and sometimes another, is prominent. My presentation of self includes :

- (a) Organic sensations.
- (b) Skin sensations.
- (c) Motor sensations.
- (d) Visual image of my body.
- (e) Ideas of the principal events of my past life.
- (f) Ideas of my favourite objects of desire.
- (g) The concept of self, as a general form, binding the rest together.

The first three are specially important, even in the

most intellectual minds. Thus Professor James asserts that his presentation of self consists mainly of vague organic sensations, which he locates in the head, or between the head and throat. He maintains that "our entire feeling of spiritual activity, or what commonly passes by that name, is really a feeling of bodily activities, whose exact nature is by most men overlooked."¹ How important the organic sensations are, is shown by the effects of illness and drugs in producing a change in the consciousness of self. Under the influence of a bad attack of influenza or when drugged with atropine, we no longer "feel" the same persons. It is not merely that our presentations are changed: *we* are changed. There is no longer the old keen recognition of percepts and thoughts previously experienced, but only doubtfulness and confusion; and at the worst a positive inability to identify the present self with the past. The old self seems to break up: and if the conditions are prolonged a new self is formed, differing in content, but apparently having the same general form and degree of development as the old one.

In many cases of insanity the contents of the concept of self are so changed that the patient regards himself as some other person, *e.g.*, the Emperor of China, or the Apostle Paul, or even as an inanimate object. Hypnotic patients in the same way, while retaining the *form* of the concept of self, apparently

¹ "Principles of Psychology," i. 299-302.

fill it with an entirely new content. The most extreme type of this abnormality occurs in cases of what is called *double* or *multiple personality*. In such cases the physical conditions which initiate organic sensations are much changed. Thus the pulse, respiration, digestion, excretory processes, etc., are frequently altered, and partial anæsthesia often occurs.

§ 5. The Development of the Idea of Self.

Three phases have been discriminated¹ in the development of the concept of self.

(i) In the first of these, self is largely identified with our own body. The organic sensations are of pre-eminent importance and interest; other percepts only interest us in relation to these. This is the baby's self, at present only an object among objects, but having, as Ward says, "a unique interest."

(ii) As the child's mind develops, numbers of images and recollections are formed, the past and future come to have a meaning for it, and a true psychical self comes into existence. A generic image of self is formed, and becomes the centre not only of memories but of desires and emotions. The child learns to take pride, feels shame, and so on, not only in reference to its body but its mind. In fact, this inner self is largely emotional in its origin. It is love and anger, pride

¹ Ward, article "Psychology," pp. 83 *sq.*

and shame, that force on the child the need to think of itself as a self. But language does almost as much, and the use of "I" obliges the child to form a concept corresponding to it. This is not peculiar to the case of self; in the process of education (notwithstanding the theories of doctrinaire educationalists who do not actually teach) names naturally come before ideas. But the concept of self has enormous interest; and children when they first form it often develop for a time a quarrelsome and as it were litigious disposition, due to the exaggerated importance which the new idea assumes in their minds.

(iii) A third step is the recognition of self as a person having a definite character and history, with rights and duties corresponding. The notion of personality comes to pervade our thought; and others are no longer merely sensitive and emotional objects, but persons. We at the same time both connect ourselves with others, and emphasize our own individuality. Our social and our individualistic tendencies both of them receive a sudden and marked development. We begin to fall in love, and to take on us social duties on the one hand; and on the other, insist more and more on determining our own career. Introspection has special charms for reflective boys and girls at this period of their lives, and they often take themselves much more seriously at sixteen than they do at sixty.

Thus we come to have a conception of self more or less adequate to the circumstances in which we are placed, just as we have a more or less adequate concep-

tion of the universe at large. For a civilized adult the elements derived from organic sensation, although still of supreme importance, are no longer the most prominent and clearly distinguished features. The unsystematic introspection called self-consciousness is forced on us by our daily contact with others. Language, law, morality, art, religion, social customs, all stimulate our attention to the phenomena of consciousness and our reference of them to a central self, which can be admired, loved, hated, punished, shamed, saved, damned, and so on. Modern social conditions are constantly obliging us to refer to this personal self, which is to a great extent their own product.

CHAPTER XI.

FEELING AND EMOTION.

§ 1. Feeling.

THE term Feeling, like most psychological terms, is ambiguous. It is used as equivalent to (1) sensation in general; (2) sensation of touch; (3) vague undifferentiated consciousness as opposed to clear consciousness; (4) consciousness in general; (5) the affective or emotive element in mental states, the *being pleased or displeased* with a presentation. This last use is the most common amongst accurate writers of the present time. Amongst English psychologists who follow it are Bain (as a rule), Ward, and Stout. The other uses had better be avoided.

Feeling, then, is not in itself a presentation; but a way in which a presentation affects us. It is, says Ward, "a purely subjective state, at once the effect of a change in receptive consciousness and the cause of a change in motor consciousness." Hence, as he paradoxically urges, we can never know a feeling. We can only know *of* it, by apprehending its cause and the changes which feeling produces in the character and succession of our ideas. This only means that although

I know I am pleased, yet the pleasure itself can never come into the focus of attention, but only the presentation that causes it, or the rapid and easy flow of ideas resulting from it, and the organic and motor sensations (presentations) produced by it.

Pure feeling cannot be cognized ; but *a* feeling may be, because *a* feeling is a psychosis or concrete state having cognitive and conative elements as well as the element of pure feeling.

Pure feeling is either pleasure or pain, and hence some writers have preferred the term pleasure-pain for it. Bain, following Reid, urges that some feelings are neutral, *e.g.*, surprise. He maintains that a feeling may have considerable intensity and yet be neither pleasurable nor painful, but simply a state of neutral excitement.¹ Here he seems to make a mistake, for (1) apprehension of excitement is not feeling, but cognition ; (2) the highly complex state called surprise is not a pure feeling, but a psychosis which may be pleasurable or painful according to circumstances, and is often both at the same time.

We may admit with Bain and Wundt that as pleasure passes into pain, in consequence of the gradual intensification of a sensation, the feeling must theoretically pass through a neutral point. But this mathematical point is just the point where feeling disappears.

Two further ambiguities must be noticed. A plea-

¹ "Emotion and the Will," p. 13 (3rd edit.).

sure or a pain (like a feeling) is a concrete state or psychosis, and not mere pleasure or pain. When we say that a man's pleasures are music and cycling, and that the former is a higher pleasure than the latter, we obviously use the term in its concrete sense.

Again, pain is sometimes spoken of as a *sensation*.¹ When the word is used in this sense it no longer means pure feeling of a certain kind, but a presentation due to organic injury, and having a markedly painful tone. We may, in fact, by introspection, perceive a distinction between the pure pain or unpleasantness of an aching tooth, and the sensation of pain itself. The latter is "in the tooth;" the former is much less definitely localized.² Pain-sensations are presentations having recognizable differences of quality as well as of intensity. Pure pain is not a presentation, but the way in which presentations affect us; it is only expressible by the cry which I have heard a suffering child utter, "I don't like it, take it away." It has intensity, but no quality, except this of causing aversion. The distinction and comparative independence of pure pain is evidenced in several ways. (1) Introspection, as we have seen, shows that the painful organic sensation of (say) toothache, is not the same thing as pure pain. More obviously still, the aversive affection with which one contemplates imminent calamity is distinguishable from pain-sensation. When Cassio laments his lost reputation, he is in no danger of con-

¹ See above, chap. v., § 1.

² Kirchner, "Outlines of Psychology," p. 95 *sq.*

founding the pain he feels with any pain-sensation, although he expresses himself in the same way as he would do if he had experienced such a sensation.¹ (2) Pain-sensation may be destroyed by anæsthetics or hypnotism, while the capacity to feel pure pain causing aversive movements remains. (3) Physiological research goes to show the existence of distinct nerves of pain-sensation; while pain-feeling is a diffused state having for its physical basis the general condition of the organism.

§ 2. The Causes of Pleasure and Pain.

Plato, in some of the Dialogues, speaks of pleasure as due to the reaction from pain; it is a mere progress towards the restoration of the equilibrium or harmony of the organism, which has been upset by pain.² This view in later times has been adopted by Schopenhauer.

Aristotle taught that pleasure and pain are both equally real. He further laid down the law which, with some modification, is still commonly accepted, as to the conditions under which the two forms of feeling arise. Pleasure is the concomitant of perfect activity of the senses and intellect, viz., such activity as proceeds from a faculty in perfect condition and acting on its best objects.³

¹ "As I am an honest man," says Iago, "I thought you had received some bodily wound."

² "Philebus," 31-32 (Steph.).

³ "Nicomachean Ethics," x. 4.

Rendered less definite and stated in physiological terms, this becomes the Law of Self-Conservation, as enunciated by Dr. Bain: "States of pleasure are concomitant with an increase, and states of pain with an abatement, of some or all of the vital functions."¹ The truth of this generalization is especially noticeable in the case of the organic sensations; but it is not at all obvious in the case of some of the special sensations. The smell of jasmine is not accompanied by a higher vitality than the smell of sulphuretted hydrogen; the crude aniline dyes and the tone of a cornet are not depressants. Again, we do not find ourselves more hungry and readier for physical exertion after seeing a Titian than after seeing the work of a pavement artist. Prof. Bain brings forward the following replies to further objections: (1) that when, in pain, certain muscles operate, they are muscles of small size, whose contraction more thoroughly relaxes larger muscles; and (2) that the violent stimulating effects, sometimes apparently due to pain, are really the results of general systemic excitement, paid for by subsequent prostration, and not the results of vitalizing energies. This seems to overlook the fact that prostration is as often due to increased activity produced by pleasure, as to any general stimulation produced by pain.

This connection between pleasure and increased vitality, and their opposites, has, we may add, been widely accepted by psychologists. Mr. Herbert Spencer

¹ "Mental Science," p. 75.

states the relation thus: "Generally speaking, pleasures are the concomitants of medium activities, where the activities are of kinds liable to be in excess or defect; and where they are of kinds not liable to be excessive, pleasure increases as the activity increases, except where the activity is either constant or involuntary." He shows that "pleasures are the incentives to life-supporting acts, and pains deterrents from life-destroying acts." This is brought about by the Survival of the Fittest; since those races of animals whose pleasures and pains are not the correlatives of acts which are respectively beneficial and injurious, must disappear. But, it applies less to men, because men are more complex, the unfit are not allowed to disappear, and the environment is ever changing, and thus demanding re-adaptation on our part.¹

Pleasure accompanies moderate and just super-moderate stimulation; while pain is produced by *excess* of stimulation and *conflict* of stimulation. As a stimulus is increased from a very moderate to a very high degree of intensity we have the following phases shading off into each other. (1) Sensation without appreciable feeling of pleasure or pain; (2) increased sensation with some degree of pleasure; (3) increased sensation with diminished degree of pleasure; (4) increased sensation slightly painful; (5) increased sensation of less definite quality extremely painful; (6) increased sensation with scarcely any

¹ "Principles of Psychology," i. 272-288.

definite quality but intolerably painful. This last stage is accompanied by rapid and often irreparable destruction of nerve tissue. In the same way a rivalry of stimuli which renders accommodation of the nerves impossible, becomes more and more painful as it becomes more and more effective. The pain which accompanies the percepts of a flickering light or of a discord in music, has been plausibly traced to this cause. As each bright phase of a flickering gas-light occurs, the nervous apparatus tends to become accommodated to it; before the accommodation is complete, the dark phase occurs and a fresh accommodation is necessary. There is constant change of conditions, and constant failure to accommodate; and therefore wear and tear of the nerve-structure, and therefore pain.

In both excessive stimulation and discord, therefore, there is wasteful destruction. Pain is the psychical concomitant of this physiological fact; while pleasure accompanies increase of stimulation short of this destructive stage. As Grant Allen puts it, the condition most favourable to production of pleasurable sensations is "maximum of stimulation with minimum of fatigue."

Dr. Ward objects that these statements are not psychological at all. He formulates a law of feeling entirely in terms of consciousness, thus:—"There is pleasure in proportion as a maximum of attention is effectively exercised, and pain in proportion as such effective attention is frustrated by distractions, shocks,

or incomplete and faulty adaptations, or fails of exercise owing to the narrowness of the field of exercise and the slowness and smallness of the changes.”¹

This gives a reply to the question, What are the psychological antecedents of pleasure and pain respectively?

Mr. Stout prefers to state the law in closer connexion with conation. “The antithesis between pleasure and pain is coincident with the antithesis between free and impeded progress towards an end. Unimpeded progress is pleasant in proportion to the intensity and complexity of mental excitement.”²

It is not difficult to exemplify these laws by reference to the pleasures and pains of the higher senses (æsthetic) and of exercise. In the case of the lower senses we had better fall back on one of the more physiological statements, such as that of Bain. His Law of Conservation explains very well many of the pleasures and pains of the lower senses and of the organic sensations, to which these notions of furthered or impeded attention, and of furthered or impeded activity towards an end, do not easily apply. But it leaves other pleasures and pains of the same type unexplained. Why it is that a whiff of otto-of-roses is sweet and a whiff of sulphuretted hydrogen the reverse; why the taste of rancid butter is disgusting while that of fresh butter is pleasant, can hardly be considered solved by any of the formulæ at present put forward.

¹ Article “Psychology,” p. 70.

² “Analytic Psychology,” ii. 270.

§ 3. Emotion.

Pure feeling is either pleasant or painful. The complex groups of presentations surcharged with such pleasure and pain, which we call feelings, emotions, etc., are of very various and indefinite character.

These various presentations affect us differently, and thus we can detect by analysis in an emotional state, not only a prevailing feeling of pleasure or pain, but subordinate feelings of pleasure and pain which are more or less fused. On receiving a present, a man's emotional condition may be mainly pleasurable; but he may detect separate strands of pleasure arising from the person, the occasion, and other circumstances of the gift, together with some of pain, *e.g.*, regret that the giver should have spent so much money, or that he did not give something more useful. The whole affective tone is a resultant of the separate affective tones.

In this mass of feeling and vague presentation the definite features, such as they are, are almost entirely due to the marginal and subconscious presentational elements, partly of the nature of external perception, and partly ideal or imaginative; but mainly belonging to the class of internal percepts known as organic sensations.

Hence the plausibility of James's suggestion, that emotion is only the perception of the bodily changes which occur in consequence of a presentation or idea.

What other psychologists usually call the organic *accompaniments* of emotion or the instinctive expression of emotion, he insists is the necessary *cause* of the emotion, which is therefore an essentially cognitive condition of consciousness.

“Common sense says, we lose our fortune, are sorry and weep ; we meet a bear, are frightened, and run ; we are insulted by a rival, are angry and strike. The hypothesis here to be defended says that this order of sequence is incorrect, that the one mental state is not immediately induced by the other, that the bodily manifestations must first be interposed between, and that the more rational statement is that we feel sorry because we cry, angry because we strike, afraid because we tremble ; and not that we cry, strike, or tremble because we are sorry, angry, or fearful, as the case may be.”¹

Although this view is not maintained with complete seriousness even by its author, yet there is a good deal of truth in the emphasis laid on the part played by the dim cognitions (marginal and sub-conscious) we derive from the organs of the body—the circulatory, respiratory, digestive, motor and sexual apparatus. In all emotional states we find there is an overflow of nervous excitation beyond the brain and nerves and the muscles directly concerned. When I see a cat the nervous flow is slight in amount, and is wholly expended in those cerebral changes which under-

¹ James, “Principles of Psychology,” ii. 449-450.

lie the psychical fact of the association of ideas. When a cat-lover, or a cat-hater, sees a cat, the nervous flow is much larger in extent and expends itself in producing muscular contraction and changes in the viscera. These changes, produced by the diffused nervous excitation, are vaguely cognized, and may indirectly produce still further excitement.¹

Recent experimental research has confirmed this opinion. P. Sollier has shown by observations conducted on certain persons suffering from anæsthesia and on others under hypnotic suggestion, that in proportion as the general sensibility (cœnæsthesia) is diminished, so is the capacity for emotion, and that the visceral sensations are very much more important in this connexion than the motor sensations. If the former are abolished, emotion is no longer possible; if the latter, emotion is still possible, though it arises more slowly.

§ 4. Expression of the Emotions.

The expression of emotion is, unlike the expression of thought, essentially instinctive. In fact, as we have just seen, the "expression" is, in reality, a part of the cause of the emotion. Where emotion is said to be suppressed, it is only the more obvious outward signs that are inhibited. The visceral and glandular changes are still there, and can always be detected by

¹ This view, or something like it, is also advanced by Professor Lloyd Morgan in his "Habit and Instinct," chap. ix-x.

feeling the pulse, watching the secretion of tears, etc. In the same way, the actor, to begin with, imitates the external signs. In so far as he really *feels* his part, he has not completely isolated the two sets of bodily changes, viz., the general and widely diffused (visceral) and those of the special external muscles.

Other things equal, the greater the amount of feeling, the greater the amount of diffused neural excitement. When we are deeply moved, the whole nervous system seems to participate. At other times the discharge is more limited in amount, and then the smallest muscles and those which are attached to and have to move the smallest weights are first affected. Thus when we are pleased the small muscles of the mouth and corners of the eyes first begin to contract. If the stimulation is kept up and the excitement increases, the smile gets more and more marked, and all the muscles of the face bear their part. If we are still more excited, the muscles of the neck and chest are violently and irregularly contracted; and finally the whole body is contorted and rolls from side to side.

This "irradiation" of nervous energy, as Lewes calls it, sometimes gradually dies away, and sometimes automatically brings about its own cessation by invading the nerves which control the vascular system, and thus diminishing the supply of oxygenated blood. After a violent fit of laughter, as well as after excessive fright, we sometimes feel quite weak and almost unable to stand. Emotional trembling and blushing are both, though in different ways, due to this overflow of

nervous excitement. In trembling, the muscles of the limbs and trunk become irregularly stimulated. The over-irritation of the vaso-motor nerves decreases the supply of pure blood to the nervous centres, and the stream of nervous energy to the muscles is diminished, so that the muscles are no longer kept steadily contracted by a full and equable flow, but the neural stimulus comes in gushes, and the opposing flexor and extensor muscles alternately and irregularly contract. In blushing, and in the sudden pallor which often precedes or follows it, those nerves which control the flow of blood to the capillaries immediately beneath the skin are affected, and thus is produced local anæmia or hyperæmia.

Besides these general discharges, there are the restricted discharges which produce their specific effect by "relations established in the course of evolution between particular feelings and particular sets of muscles habitually brought into play for the satisfaction of them."¹ Thus the frown was originally useful in shading the eyes of combatants, while setting the teeth and dilating the nostrils have an obviously serviceable effect in combat. Actions useful in physical opposition serve to express our feelings when we meet with opposition of any sort. This is practically the same as Darwin's principle of "serviceable associated habits," which he states thus: "Certain complex actions are of direct or indirect service under certain

¹ Spencer, "Principles of Psychology," ii. 545.

states of the mind, in order to gratify certain sensations, desires, etc.: and whenever the same state of mind is induced, however feebly, there is a tendency through the force of habit and association for the same movements to be performed, though they are not of the least use."

Darwin also lays down another principle which he supposes to account for a class of actions that are more difficult of explanation. According to the law just stated, certain states of mind become associated with certain muscular movements. "Now when a directly opposite state of mind is induced, there is a strong and involuntary tendency to the performance of actions of a directly opposite nature, though they are of no use; and such movements are in some cases highly expressive."¹ Thus as a dog becomes rigid when he is angry, so he fawns and throws himself into loose curves when he is pleased. This principle of antithesis has not met with much support from psychologists.

Other less doubtful principles may, however, be detected. We consciously associate certain feelings with certain muscular movements by extending an expressive movement to analogous cases. Feelings of moral courage and resolution are expressed by clenching the fist, although there is no adversary to encounter, because the natural expression of physical courage, a serviceable associated habit due to inheritance, is extended to the analogous case of moral

¹ "Expression of the Emotions," chap. i.

courage. According to Wundt, we open and fix our eyes in order to express earnest attention, because this mode of expression has been extended from the case of interesting objects of visual perception to the analogous case of objects of internal attention. Again, Spencer points out that besides the involuntary restricted discharges, there are voluntary directions of energy on particular muscles, complicating appearances by super-posing on the primary expressions certain secondary expressions which result from our endeavour to conceal the original expressions, and thus constituting a "natural language of suppressed feeling." The hollow smile is as eloquent of dislike as the actual frown, the bitten lip and suppressed smile often tell us as much as the body convulsed by uncontrollable laughter. Spencer instances the expression we call sly, caused by our checking the movement of the head which we usually make when we desire to look at something on one side of us, and substituting a movement of the eyes alone.¹

§ 5. Classifications of Feelings.

Since mere feeling is not a presentation at all, and since the somatic sensations which supply a large part of the cognitive element in an emotional state are dim, confused and ill-defined, any satisfactory classification of emotional psychoses is impossible.

¹ "Principles of Psychology," ii. 552.

It is, however, necessary to attempt some kind of grouping, more for practical than theoretical purposes.

To speak first of some of the earlier writers, Spinoza¹ regards the three passions or affections, desire, joy and sadness, as the primary ones, from which all others are derived. Thus the emotion of love is joy accompanied by an idea of its external cause, a complex state specifically determined by its intellectual element. In the same way, hatred is sadness accompanied by an idea of its external cause. Hobbes has a somewhat similar arrangement.² He recognizes four primary modes of feeling: Desire, Aversion, Pleasure, and Pain. Each of these he subdivides into two according as the object is present or absent. Thus we get eight "simple passions," love and desire (proper); hate and aversion (proper); bodily pleasure and joy; pain (proper) and grief.

Dr. Bain does not attempt a scientific classification; he gives an enumeration of genera, without attempting to group them under higher genera; nor does he follow any consistent method of demarcation. He names love and anger, however, as the two "commanding and indispensable members of the emotional scheme."

Spencer makes his division of the feelings parallel to his division of cognitions, viz.:—(1) *Presentative* feelings or sensations, in which we contemplate the feeling in itself as pleasure or pain, and do not localize it and classify it as we do our presentative cognitions,

¹ "Ethics," part iii.

² "Leviathan," chap. vi.

(2) *Presentative-Representative* feelings, in which a "sensation or group of sensations, or group of sensations and ideas, arouses in us a vast aggregate of represented sensations ; partly of individual experience, but chiefly deeper than individual experience [that is, due to inheritance from our ancestors] and consequently indefinite." Most of the ordinary emotions belong to this class ; *e.g.* terror. (3) *Representative* feelings, which are simply ideas or representations of feelings belonging to either of the preceding classes, revived feelings called up from within by association, and not by direct excitation from without. Such are the emotions felt by the poet or novelist when he is depicting emotion on the part of his characters. (4) *Re-representative* feelings, which include those " more complex sentient states which are less the direct results of external excitements than the indirect or reflex results of them." To this class belong what some other writers call Sentiments. Spencer gives as examples the love of property and the still more ideal sentiment of justice. This classification ¹ is one which has the advantage of arranging the feelings in accordance with their increasing complexity. But, as Mr. Spencer says, the groups are " but indefinitely distinguishable." The same emotion may often claim to appear in any of the last three classes according to its stage of development, since qualitative differences have no part in the division. The classes are too wide, and have too little to do with the ordinary practical point of view

¹ "Principles of Psychology," ii. 514 *sq.*

for the classification to be of much value. Feelings of the most heterogeneous character are placed together. Thus anger, love, æsthetic emotion, contempt, fear, may be all put in the first class.

Sully treats the emotions under the following heads.¹

I. Unspecialized pleasurable and painful feeling (joy, grief).

II. Instinctive and animal emotions (anger, fear, fondness), excited by percepts.

III. Representative emotions.

(a) Concrete—Sympathy and other emotions excited by *idea* of their objects.

(b) Abstract—Sentiments attaching to truth, beauty, etc.

Ward adopts a division of the Herbartian type.²

I. Material or qualitative depending on the char- acter of the presenta- tions.	{ 1. Depending on simple presentations. 2. Depending on complex and abstract represen- tations.
II. Formal, depending on relations between the presentations.	{ 3. Depending on combina- tion of simple presen- tations. 4. Depending on combina- tion of complex and abstract representa- tions.

¹ "Human Mind," ii. p. 84.

² Article "Psychology," p. 67 *sq.*

To class (1) belong pleasures and pains arising from simple colours and tones, etc.; and to class (2) belong egoistic, sympathetic, and religious emotions, involving distinct self-consciousness; to class (3) belong simpler æsthetic feelings, such as those due to harmonies and contrasts of colour and tone; to class (4) belong the higher intellectual feelings and higher æsthetic feelings. He speaks, however, of a special class of *reflex* feelings which arise from the memory or expectation of feelings, such are hope, fear, regret. They are found involved in all the higher feelings.

Another classification founded on the Herbartian distinction between material and formal feelings may be here given: ¹

I. Feeling proper—without admixture of intellectual and conative elements.

A. Material or Qualitative, and depending on the special character of the presentations.

(a) Sensuous feelings, *e.g.*, pleasures of single colours, sounds, etc.

(b) Intellectual feelings, depending on concepts, *e.g.*, emotions of truth, beauty, goodness.

B. Formal, depending only on the manner in which the presentations are related to each other.

(a) General or more elementary feelings, *e.g.*, pleasures and pains, oppression and relief, exertion and ease, harmony and contrast, etc.

¹ From Nahlowsky, as given by Bain, "Emotions and the Will," Appendix.

(b) Special or more complicated feelings, *e.g.*, expectation, hope, astonishment, apprehension, doubt.

II. Complex emotional states.

1. (a) Sympathy.

(b) Love.

2. (a) The Disposition or relatively permanent emotional tone.

(b) Affections, that is, transitory disturbances caused by strong unexpected stimuli. These fall into two groups.

(i) The active and pleasurable, *e.g.*, mirth, courage, rage.

(ii) The passive or painful, *e.g.*, embarrassment, depression, fear, shame, despair.

(c) Passions, that is, fixed predominating emotions, complicated by desire, which are out of the control of the reason.

§ 6. Groups of Allied Emotions.

The student should exercise himself in analyzing groups of allied psychoses, such as—

(1) Envy, hatred, malice, jealousy.

(2) Pride, vanity, conceit, self-esteem.

(3) Fear, horror, terror, anxiety, apprehension.

(4) Veneration, esteem, respect.

(5) Wonder, surprise, amazement, admiration.

He should point out the different characteristics of each member of the group, as feeling (pleasure, pain);

as cognition (whether due to percept or concept; the mass of vague sensation, visceral, muscular, etc.); and conation (connection with desire or aversion). He should point out how each member of the group is related to the others.

It is to be noticed that the terms denoting emotions are used very loosely in literature as well as in ordinary conversation. Most attempts at distinction necessarily involve a more or less arbitrary limitation or extension of the denotation of the terms. The greater accuracy of connotation is as a rule purchased at the cost of divergence from accepted usage.

The following terms may be mentioned as examples of the ambiguity of even the psychological use of terms which denote emotional psychoses.

An *affection* meant originally any kind of emotion. Sully wishes to confine it to "a *recurring* feeling or fixed emotive disposition, as in the case of what are popularly called affections, viz., human attachments." The German psychologists use *Affect* for any violent emotion which produces disorder in the train of ideas, and commonly includes unconscious movements.¹ Reid defines it as a "principle of action" (*i.e.*, emotion or conation) which has "persons for its object, and implies in its very nature our being well or ill affected towards some person or at least to some animated being."

In the same way *passion* was originally used to

¹ This was Kant's use of the term as laid down in the "Anthropologie," § 71.

denote any kind of emotion, and as an equivalent of the Greek *πάθος*. It is so used by Locke. In English popular language for three hundred years a passion has meant a strong and violent emotional outburst, and is thus equivalent to what the Germans called an *Affect*. Reid, who is a good witness to popular usage, employs it in this sense. And it may be noted that the German *Leidenschaft*, usually translated "passion," means a quiet flow of feeling.

The meaning usually attached to *sentiment* by English psychologists, is that of a more refined and equable form of emotion, less marked by physical changes than affection or passion, and aroused by an abstract idea rather than by a person. Such are the sentiments of patriotism; and still more distinctively, the higher intellectual feelings (love of knowledge), moral feelings (moral sentiment, love of justice, love of truth), and the æsthetic feelings (love of beauty, the ludicrous, etc.).

A very interesting group of pleasurable emotions are those connected with sport, gambling, etc. In all these there are certain common features.

(1) Pleasures arising from pursuit, the emotion of action, as Bain calls it, of which the central feature is the engrossing attraction of continuous action directed towards the achievement of an end.

(2) Pleasures of competition.

(3) Pleasures of successful achievement.

(4) Pleasures of uncertainty, if of a moderate sort.

(5) Pleasures of surprise, due to unexpected turns

of the game. Without this, sport and games would be no more exciting than mental or physical exercise in which competition is present.

(6) Pleasures of exercise, mental and bodily.

(7) Pleasures due to heightened vitality. These chiefly in out-of-door sports.

(8) Pleasures due to sympathetic co-operation in aiding one's own side, in such games as cricket, football.

§ 7. The *Æsthetic* Emotions.

A case of special interest is that of the *æsthetic* emotions. They arise before any distinct *æsthetic* judgments have been made. The child feels a glow of *æsthetic* feeling in the presence of a beautiful face or a beautiful landscape long before he learns to call it beautiful. But as *aesthetic* concepts are formed and we consciously formulate our likes and dislikes, these emotions greatly increase in volume and importance.

The determination of the idea of Beauty belongs to the science of *Æsthetics*. Just as *Metaphysics* is a criticism of knowledge and of what pretends to be knowledge, and as *Ethics* examines the idea of Right and gives us criteria of good conduct, so *Æsthetics* analyzes the Beautiful. In each case a special department of Psychology traces the characteristics of the mental states which are concerned in or accompany the apprehension of the idea, but does not determine what

the idea itself objectively involves. It analyzes the faculty by which we apprehend beauty or truth or rightness, and the nature of the emotions which grow up around the idea, but does not examine the ideas of the beautiful, the true, or the right. It is not, however, easy to keep the two inquiries distinct, and more may be lost than gained by a pedantic insistence on the distinction.

The chief peculiarities of the æsthetic feelings are : (1) their immediate causes are chiefly sensations of sight or hearing. Perhaps we ought specially to mention muscular feeling, which to a large extent gives the element of *form* not only in sight, but also in music. (2) They are not concerned with the preservation of oneself or the species ; they are not cultivated as a means to an end. They do not minister to our necessities, at any rate in a direct or conscious fashion. (3) They are almost entirely unconnected with volition, differing on this point very much from our ethical feelings. (4) Hence these pleasures are " pure " in a very high degree, singularly free from all alloy of pain, such as accompanies even the most exalted desires ; equable and persistent, they are followed by no unpleasant reaction. (5) They are unselfish, and are capable of being shared by a large number at once.

If we stand before a beautiful picture, we can discriminate the following sources of enjoyment : Colour ; light and shade ; beauty of outline ; composition (arrangement of the constituent elements of form) ; fidelity to fact ; method of treatment (simplicity, romance,

forcibleness, quaintness); and subject. On analysis these resolve themselves into: (1) material, or sensuous beauty, including pleasures arising from colour and light and shade; (2) formal, that is, pleasure arising from outline and composition; (3) pleasure arising through association, conscious or unconscious, intellectual in the form of memory, or emotional in the shape of waves of vague feeling, including accuracy of representation, method of treatment and subject. In Music, tone and timbre belong to the sensuous element, rhythm and "form" (in its special technical sense) to the element of perception; while association is more limited in its scope, since Music is not a representative art.

As Mr. Sully puts it, "the effect of beauty seems to depend on a simultaneous presentment in a single object of a well-harmonized mass of pleasurable material or pleasurable stimulus for sense, intellect, and emotion." In all beautiful objects we have variety unified. Given a great multiplicity of elements, the greater the unity the greater the pleasure, though the unity may be not quite easy to detect. On the other hand, we get a larger mass of pleasure from a large oil painting than from a monochrome sketch, because of the greater variety of elements.

Nevertheless, it can be easily seen that in some cases the beauty depends rather on the nature of the original sensuous matter than on the completeness of the synthesis. Music and architecture are two arts in which this distinction is clearly manifested. The

beauty of a symphony does not lie principally in the subordination of parts to the whole, but in the beauty of the units of which each movement is made up. The beauty of a temple does not lie chiefly in the beauty of the separate mouldings and capitals, but in the co-ordination and subordination which makes each part necessary to the rest.

We have seen that an attempt has been made to express the psychological conditions of pleasurable stimulation in the formula "Maximum of stimulation with minimum of fatigue," and thus to resolve qualitative differences into quantitative. The point at which the stimulation is felt as unpleasant is determined by the amount of the physical stimulus and the condition of the nervous system. Thus fatigue is more easily produced by flickering light, or by discords, because in these cases the stimulation is intermittent, and the nerves are being constantly restored in the intervals of stimulation; while in the case of continuous sensation the organ is gradually deadened.¹

We may perhaps note in the case of æsthetic emotion a distinction parallel to one which has been pointed out with regard to the moral sentiment. There is the love of beauty itself, which follows to a large extent, and entirely conforms itself to, the æsthetic judgment. What we judge to be beautiful, that we admire because it is judged to be beautiful. But in addition to this we have special

¹ For a criticism of this theory, cf. Gurney, "Power of Sound," Appendix C.

likings for certain artistic effects, which are apt to assert themselves even in opposition to the love of abstract beauty, because they originated when our taste was less refined. Old-fashioned people often have a very real, though perhaps concealed, tenderness for the colours, patterns, and melodies which they used to admire when young; they still sometimes prefer emerald to olive green, and furniture of the curly kind to that which is marked by less exuberance of line, while frankly owning that their preferences are not by any means artistically defensible. Such feelings we may call "quasi-æsthetic."

§ 8. Relation of Feeling and Intellection.

Feeling both promotes and hinders cognition. We attend only to what interests us, and interest is only another name for feeling. The first thing we have to do in teaching the young is to arouse a condition of curiosity and anticipation. A whole group of feelings have special connexion with the exercise of the intellectual faculties—surprise, curiosity, wonder, etc. In the fullest development of mind we have the still more impersonal type of feeling called love of truth. This can arise only "when the relation among the ideas becomes the determining factor quite apart from the internal or external consequences which the cognition has for us."¹

On the other hand, all excited and tumultuous

¹ Höffding, "Outlines of Psychology," p. 263.

feeling is inimical to the cognitive processes, whether external perception, memory, or thought. When any emotion becomes too strong and predominant, it interferes with the impartiality of cognition and with our interest in the purely logical relations of our thoughts. We see only those aspects which harmonize with and intensify the prevalent feeling. In extreme cases, all power of coherent thinking disappears.

How are emotions revived? The usual view is that emotional states are revived only indirectly, by means of the intellectual states with which they are connected. When we consider the nature of emotion, how even the cognitive elements in it are dim and marginal or subconscious, this theory is antecedently probable. It has received the support of Höffding, Ward, Titchener, and other recent psychologists.

On the other hand, it was held by the older Associationist writers that emotional states are revived spontaneously like ideas. Thus Bain extends the Laws of Association to feelings.¹

An inquiry held by Professor Ribot a short time ago, led to the conclusion that in some persons emotional states can be revived in the same way as cognitive states, though not so easily nor so rapidly; but that in most people the revival is preceded, and prepared for, by the revival of the intellectual states which accompany them. In others, the intellectual states only are revived.²

¹ See above, chap. viii., § 5.

² See "Revue Philosophique," Oct., 1894.

§ 9. Belief.

Belief is a state essentially emotional. Hume describes it as "a peculiar feeling," different from the simple conception to which it attaches itself. "An idea assented to *feels* different from a fictitious idea that fancy alone presents to us."¹

The simplest form of belief is hardly recognizable as belief. When we clearly perceive an external object, we are, as it were, laid hold of by the fact, and make no struggle to comprehend it, because there is no conflict of presentations, and therefore nothing to originate doubt. This state of primitive credulity, as Bain calls it, is due to the limitation of our knowledge. It disappears when experience furnishes us with plenty of ideas. The child is deceived by the wax fruit, and even by the picture. In this, its first and most typical form, belief is simply unhindered perception. It is therefore essentially pleasurable.

When rivalry of ideas occurs, this state disappears. A conflict between the present percept and the present image arouses a different kind of feeling. We no longer have the unfettered play of faculty; we feel instead the pain of hindered activity. Absolute unquestioning acceptance is no longer possible. Where in any matter doubt has once been started, the primitive credulity in that matter never completely reappears; few of us are so dull or so iron-willed that we

¹ "Treatise of Human Nature," Appendix.

can keep entirely out of sight all that reminds us of the possibility of doubt. All subsequent belief falls short of perfect certainty.

When we say that we believe A is B, or we know that A is B, we mean that the proposition takes hold of us, and impresses us as vividly as do the objects of actual perception. This is, however, always an exaggeration. Belief in a proposition can never be as absolute as belief in a presentation; because (1) concepts never convince and hold us with the intensity that percepts do; they are less vivid, less directly connected with our sensations, especially our muscular sensations; and (2) because a proposition presupposes a doubt, for we do not say A is B until a doubt has arisen as to what A is. Every article of the creed is a reply to a heresy.

The opposite of belief, then, is doubt. Disbelief is simply belief in a judgment opposite to some given judgment. All belief in a proposition implies disbelief in its contradictory or its contrary.

There is, no doubt, an intimate connection between belief and will, although belief is not primarily a conative state. Belief always implies readiness to act on our belief. And this is true in spite of the fact that some beliefs appear to be quite dissociated from all possibility of action in the usual sense of the word. I believe that there is hydrogen in the sun. This may be explained to mean that if I went to the sun I should expect to find hydrogen there behaving in its customary manner, and should act accordingly. Or, with less

straining, we may say with Mr. Stout that it means that I shall make this belief a starting point for further mental processes. On this view the readiness for action implied by my belief is readiness for intellectual action.¹ Accordingly we see that men of great bodily and mental activity (not necessarily of great reasoning power, which often involves slowness of intellectual movement and constant hesitation) are as a rule men of easy and strong belief.

Belief, then, is a state of assent, of ready intellectual synthesis, marked by pleasurable tone; while the state of doubt is one of hindered synthesis, due to rivalry of ideas, and is emphatically unpleasant, especially when circumstances call for action of a definite kind, whether bodily or mental.

Among the circumstances which induce a ready belief are :

(1) Vividness and definiteness of the presentations. Thus percepts are more easily accepted than images, and especially percepts involving visual, auditory and muscular sensations. Hence the value of religious symbols, such as crucifixes and pictures. Above all, the so-called muscular sensations assist belief: the sceptic once on his knees has for the time half regained his faith.

(2) Absence of rival ideas. Thus the images of dreams and of the hypnotic state are more easily accepted than those of waking life. The stream of consciousness has been reduced to a thin trickle, and the

¹ "Analytic Psychology," ii. 226-228.

competition of ideas proportionately reduced. Sometimes the vividness and intensity of a given idea seems directly to inhibit the formation of other ideas, as when a fixed idea obtains possession of an enfeebled mind, and wholesome rivalry becomes impossible.

(3) Agreement with the temporary emotional tone, or the permanent emotional tendency. Feeling exercises a great influence on assent. Where strong feeling of any kind predisposes us to accept a percept or other idea, we are much more likely to do so than at other times. When we are angry with anyone, we are more ready to believe evil of him; and the hot-headed partisan is always predisposed to entertain scandal about the opposite side. In the same way, what is contrary to feeling is likely to be rejected. The lazy man will believe some things because they involve little exertion, and disbelieve others because they involve much.

(4) Agreement with objects of desire. "If denial is tantamount to sacrificing a cherished aim, the whole strength of the desire contributes to enforce the affirmative side;"¹ indirectly, by blinding us to the existence or import of rival ideas, and directly, by strengthening our hold on the accepted ideas. The fanatical leader of men easily believes signs and wonders which appear to strengthen his right to lead. All men who feel the need of action are likely to believe readily, because they desire strongly and on

¹ Stout, "Analytic Psychology," ii. 254.

slight provocation. Where inaction is specially painful, doubt is specially irksome.

While the term "belief" denotes a state of feeling; the term "*a* belief" is used to denote a proposition that is believed. In the same way we have noticed a distinction between feeling, and *a* feeling; between pleasure, and *a* pleasure.

The relations between the terms "knowledge" and "belief" are a little confusing. All knowledge is belief. When we say we know a thing, we mean that we accept it absolutely, and that we cannot be more certain than we are. As a matter of fact this is seldom quite true, since some shadow of doubt always remains, except in cases of a hypothetical and abstract character, *e.g.*, the truths of mathematics. The differentia which marks off knowledge from mere belief lies partly in a non-psychological fact. There is little psychological difference between my knowledge and my belief that there is white paper in front of me, or between my knowledge and my belief that there is hydrogen in the sun. But the word "knowledge" implies that I can give convincing proof which will compel belief on the part of others, while the word "belief" does not. Belief is therefore not always knowledge.

When, then, we expressly distinguish Belief from Knowledge we seem to have in view (1) the absence of this reference to a common mind and a common stock of knowledge, and (2) the existence of a marked emotional tone.

CHAPTER XII.

VOLITION.

§ 1. Volition.

By the term "volition" psychologists understand the immediate mental antecedents and concomitants of bodily movement and of intellectual activity. A bodily movement itself is a physiological fact, and does not fall within the province of psychology; nor do its physical conditions, such as the structure of the limb, supply of blood, etc. But the ideas, feelings, and other mental facts which lead up to it and accompany it or follow it, fall within the scope of our science.

Is there any special element which particularizes a volitional psychosis, and distinguishes it from a mainly cognitive one or a mainly emotive one? We have already answered this question in the affirmative. It is the element of striving, of endeavour to realize an end, which in its simplest form appears in involuntary attention, the effort to keep a presentation before the mind until the process of perception is relatively complete, and which in its more developed and characteristic form involves the initiation of bodily movements to obtain a consciously-formulated purpose.

The term conation is often used as equivalent to volition, and it has the advantage of suggesting that this element of striving is the prominent feature of the state. Instinct, effort, resolution, determination, and so on, are all marked off as special forms of conation.

§ 2. Voluntary and Involuntary Movements.

Movements may be classified thus :

(1) Automatic, Spontaneous, or Random, which originate within the body without any external stimulus and without consciousness. The existence of such movements has been questioned ; thus the movements of unhatched chickens, etc., may be due to difference of pressure of temperature, etc.

(2) Reflex movements, which are apparently without consciousness, but which may be accompanied by sub-consciousness ; such are the contractions of the iris, and even the rapid closing of the eyes when a blow is threatened. These are sometimes called Excito-motor actions.

(3) Reflex movements proceeding from sensations. To this class belong swallowing, the clenching of a baby's hand round an object, etc. They are sometimes called Sensori-motor actions.

(4) Impulsive movements, before which there is consciousness of the striving, the need for doing something. Under this head we may include (i) many of

the movements expressive of emotion, (ii) many instinctive movements, especially among children and the lower animals, (iii) involuntary *ideo-motor* actions which take place under the influence of the fixed idea, as in the hypnotic state. Wundt would restrict the term "impulsive," to those acts which result from a single motive feeling.

(5) Voluntary movement proper, in which there is conscious recognition of an end to be attained.

With (1) and (2) we have nothing to do except to mention them as possibly concerned in the growth of the higher forms, or as the final condition of movements once conscious.

The third group passes over into the fourth. Thus, a decapitated frog if touched with acid makes an effort to wipe off the liquid in exactly the same way as an un-mutilated frog.

The fourth group covers a very wide range, from movements almost reflex (*e.g.*, sucking of babe at breast, clenching the hand when suddenly angered), to movements almost voluntary (*e.g.*, nest-building of certain animals).

Only the fifth group is strictly purposive. Even actions of the higher impulsive types are not clearly purposive. A domesticated beaver has been observed at certain times to set about making an imaginary dam on the dry floor with such materials as he can lay hold of, showing that the action is not due to the conscious recognition of the need of keeping a sufficient depth of water around his dwelling. The

patient acting under the suggestion of the hypnotist executes crimes without motive and perhaps without purpose.

In a typical, simple, voluntary action we have the following elements involved: (1) An image of the end to be attained, and perhaps one of the movement to be executed; (2) an appetitive or aversive impulse, desire or its opposite (the *motive*); (3) keen attention to the image of the end or of the movement; (4) painful feeling until the act is done or at least consented to; (5) the acceptance of the movement, the change to the imperative attitude, expressible only by the word "fiat," let the movement be *real*.

In the more complex forms of voluntary action, we find comparison of ends and of means to effect those ends. Some psychologists, for instance Wundt, mark off such acts as *selective* and distinguish them from the simpler type in which there is no conscious selection of the act to be done. But in all voluntary action there is selection between alternatives, though in the simpler types the alternatives are only action and inactivity.

"The transition from merely considering an object as possible to deciding, or willing it to be real; the change from the fluctuating to the stable personal attitude concerning it; from the 'don't care' state of mind, to that in which 'we mean business,' is one of the most familiar things in life," as James says; but it is, as he goes on to say, "something which we cannot translate into simpler terms."

"Effort of attention is the essential phenomenon of Will," says the same writer. But he adds, that along with this goes the "effort to *consent* to something to which our attention is not quite complete." By the effort to consent he appears to mean the adoption of the movement or the end ; the peculiar and unanalyzable consciousness which accompanies the acceptance of a certain object of desire (or course of action) as one which we will make our own.¹

One feature in all choice is the dismissal of the rival objects of desire or courses of action. This is the distinctive element in the state—the withdrawal of attention from the alternatives to fix it on what we have just chosen. As long as the alternatives are regarded as possible here and now, the choice has not been made. But even after the decision has been taken, we may recognize that had our knowledge or our motive been different we should have chosen differently. We are still aware of them as having value. With their dismissal from the field of attention comes feeling (emotion) due to relief from tension ; and with the full direction of our attention to that which we choose, ordinarily comes the feeling of unhindered activity which lies at the bottom of the states we call pleasant, joyful, and so on. Even if the choice is between unpleasant alternatives, there is a certain amount of pleasurable emotion due to the prospect of unhindered activity. It is more pleasant to face death than to remain in torturing

¹ James, "Principles of Psychology," i. 568-569.

uncertainty. We can at least begin to make arrangements for our funeral.

We may here point out an ambiguity in the meaning of a word of frequent occurrence in connection with the psychology of Will.

By *motive* is meant :

(1) The appetitive element, or craving directed to some particular object, or the impulse of avoidance. It is "the conscious impulse to action, whether desire or aversion," as Professor Sidgwick defines it. Mill, Bain and others use it in this sense. Any desire or wish is a motive. It presupposes a certain amount of emotional or affective disturbance.

(2) Such part of the represented consequences of an act (which are called collectively the *intention* of the act) as we actually desire. This is the sense in which it is used by Muirhead and Mackenzie in their works on Ethics.¹ Here the name *motive* denotes an image or concept, and not a feeling.

(3) Any influence whatever which tends to bring about voluntary action. Motives thus belong to the class of feelings or habits and desires on the one hand, or to the class of images on the other. In the one case we have, so to speak, an impelling force, and in the other an attracting force. This use, advocated by Professor Baldwin, practically combines the other two.²

¹ See Ryland, "Ethics," chap. vi., § 8. Compare "International Journal of Ethics," iv. 89, *sq.*, 229 *sq.*

² "Elements of Psychology," p. 338. It is Wundt's use.

§ 3. The Origin of Voluntary Movement.

The problem is to explain how we come to be able to perform a certain action on the occurrence of a certain presentation.

Let us suppose the stimulus is a percept, say a sensation of warmth or of light. A movement is made, probably quite wide of the mark and quite useless. But if by any chance the movement increases the pleasurable sensation (*e.g.*, throws the limb into a still warmer position) a wave of pleasurable feeling is aroused, and this serves to fix attention on the movement and on the presentation; it brings about a fresh supply of energy, and the movement is repeated with similar results. In this way a link is set up between a given presentation and a given movement.

But this elementary stage is at once followed by another. A motor-idea (image of muscular, joint or skin sensations, together with visual image of the movement of the limb) is formed, and this becomes firmly associated with the idea of the pleasant sensations to which the movement has led, so that if the latter be first suggested, the idea of the former is aroused. "When a sensation has once produced a movement in us, the next time we have the sensation it tends to suggest the idea of the movement even before the movement occurs."¹ And, further, the

¹ James, "Principles of Psychology," ii. 585.

revival of the motor-idea and the concentration of attention upon it tends to bring about the movement itself. Every clear and emphasized motor-image tends to originate the movement itself, and therefore to become a presentation. Ordinarily this tendency is held in check by the presence of conflicting ideas, but where these are absent, the tendency fulfils itself.

Various hypotheses have been put forward with regard to the nature of the simple movements with which the process begins. These may be (1) Random or spontaneous movements (Bain): (2) Reflex movements (Spencer); (3) Impulsive or appetitive movements (Sully); (4) Aversive movements (Ward). Probably all are concerned.¹ The one thing needful is that the movements should be attended to, so as to leave a motor-idea in consciousness. In so far as reflex movements (or random movements, if such there be,) are absolutely unconscious, they cannot be the starting-point.

Ward lays special stress on the part played by pain. Whatever may be the nature of the original movement, in most cases it is rather the intrusion of painful than that of pleasurable feeling that leads to its control. "Probably the most immediate connection possible between feeling and purposive action is that in which a painful movement leads through pain to its own suppression." This arises from the fact that while the movements caused by emotional diffusion in the

¹ The most doubtful are the random movements. See above, § 2.

case of pleasure are almost entirely purposeless, and serve no end whatever, in the case of pain they usually take the form of efforts to escape. What we call expression of painful feeling is at bottom movement to get away from the feeling. Here we have a closer link between feeling and movement than in the case of pleasure and its expression. "Out of the irregular, often conflicting movements which indirectly relieve pain, some one may chance to remove the cause of it altogether. Upon this movement. . . . (the last of a tentative series) attention, released from the pain, is concentrated: and in this way the evil and the remedy become so far associated that on a recurrence of the former the many diffused movements become less, and the one purposive movement more, pronounced." Thus *preventive* movements originate.¹

The further development of our control over movement need not be traced in detail. The main points to be noticed are :

(a) The movement becomes more and more definite and more and more easy. The motor-image undergoes a corresponding change. ♪

(b) Simple movements are combined, and the various elements of a complex movement are isolated and recombined.

(c) Imitation comes to the assistance of individual effort. This may be instinctive, or half voluntary, or wholly voluntary. By strengthening the visual

¹ Article "Psychology," p. 73.

elements in the motor-image it helps the child to do more easily what it already does, and also to perform new actions not previously attempted.

(*d*) Education by others assists. Through training an association grows up between the word of command and the motor-idea, so that the one suggests the other.

(*e*) In a further development the mere idea of the end sought suggests the idea of the movement, and the movement forthwith follows. Or the movement itself is wished for as an end, and performed for its own sake.¹

(*f*) In a fully-developed purposive movement the motor-idea drops out of the focus of attention and becomes marginal or subconscious. Thus when we begin to learn to play the piano or ride the bicycle every movement is pictured, though not necessarily *visually*; but as ease comes with practice, the movement follows instantaneously on the presentation. In the same way the well-drilled soldier has no longer to think about the matter when the word of command is given, for the action follows instantly on the sound being heard.

§ 4. Desire.

Psychologists often use the term somewhat differently from ordinary persons. If a percept is present, we may according to customary usage say that we desire. A child may desire an apple that is on the table, but

¹ Sully, "Human Mind," ii. 216 *sq.*

which he is unable instantly to reach ; and a lady may desire a bonnet which she sees in a window, whether she is able to go in and buy it immediately or not. There seems no adequate reason for rejecting this usage, but many writers¹ confine the term to those states of consciousness in which the object is not a percept.

Desire in the broadest sense is equivalent to (1) any impulse, appetite or conation whatever, and is denoted in popular phraseology by the words "wish" and "want." In this sense it is an essential element in all purposive activity. (2) In a somewhat more limited sense desire is opposed to the lower form of appetite called appetites ; it is more intellectual and less dependent on the needs of the body. (3) In its narrowest sense, it connotes that the object of the wish is not present actually but only in imagination.

In this limited use of the term, desire can of course only arise when such a development of volition has taken place that the mere image can arouse the tendency to movement.

Desire (in this last sense) does not arise in the very earliest stages of life, but only when trains of ideas are formed and discriminated from trains of percepts, so that our images are no longer entirely determined by percepts.

The steps in its development may be thus enumerated :²

¹ For instance, Ward, Sully.

² Ward, article "Psychology," p. 74. I have, however, ventured to make some slight alterations in the account.

(1) Trains of represented movements are associated with images of the percepts which those movements would bring about. The child represents to himself all the movements necessary to procure a piece of much-loved cake. The movements themselves at the same time tend to occur.

(2) When we have a lack of present interests or are in positive pain, attention readily fastens on an idea which "calls for more activity, requires a change of active attitude or promises relief."

(3) But if the idea (let us say, of cake) thus aroused does not lead off the pent up stream of action, that is, does not divert the tendency of the nascent movements to pass into actual movement by suggesting some profitable line of action, but keeps the attention fixed on itself, "in an attitude comparable to expectation, then we have desire." There is on the one side a great tendency to movement, on the other an image not "adequate to the intensity of the incipient actions it has aroused." "It would seem, then, that the source of desire lies essentially in this excess of the active reaction above the intensity of the representation (the one constituting the 'impulse,' the other the 'object' of desire, or the desideratum) and that this disparity rests ultimately in the fact that movements have and sensations have not, a subjective initiative."

Desire is thus a psychosis involving (1) images (a) of the object, (b) of the train of acts necessary to secure the presence of some particular presentations ;

(2) a conscious reference to self. (3) An active impulse, in the shape of (*a*) attention directed to the object and the train of motor-images, and also of (*b*) diffused tendency to movement, aroused by the image, but incapable of liberation because the object is not a percept, and we cannot instantly grasp it. If we could put out our hand and reach the object, the active tendency would pass into action without giving us further trouble. As it is, the suppression of the tendency increases the desire, and at the same time causes a distinct pain due to the acute consciousness that the idea is not yet realized. This painful feeling is not incompatible with a certain faint pleasure which accompanies the imagination of the gratification we long for—which Professor Sully calls “an ideal sip of the actual pleasure.”

Appetites are a particular group of appetences, or conations, or desires (in the wide sense) of a simpler type than the more intellectual desires. They are closely connected with the organic sensations, just as the higher desires are with the special senses. They are marked off also by the more specific character of the uneasy feeling accompanying them. And they are not constant, but tend to become periodical. It should be noticed that there are such things as artificial appetites. The cravings for food, drink, sleep, exercise, and sexual indulgence are the chief natural appetites. Cravings for alcohol, tobacco, morphia, etc., are instances of artificial or induced appetites.

§ 5. Desire and Pleasure.

In the above account it has been throughout assumed that the ordinary object of a desire, appetite, or conation (in whatever recognized sense we employ them) is an external object.

Some psychologists (pre-eminently Hobbes, Mill and Bain) allege, however, that we always aim at or desire pleasure, or at least that we do so except in certain circumstances of an abnormal character.

Thus, Dr. Bain lays down :¹

(1) That desire or craving is normally directed towards pleasure.

(2) That there is "a strict proportion between our strength of desire, or energy of pursuit, and the pleasure expected from it."

(3) That not only is it the normal fact that we desire pleasure, but it is the special mark of rational beings to "desire everything according to its pleasure value."

(4) That there are disinterested benevolent actions ; but these are akin to the abnormal case of action under the tyranny of the fixed idea. Sympathy means our possession by an idea which is followed out irrespective of pleasure or pain ; it subsists on a vivid perception of the pain of others, and is therefore followed out without regard to the pleasure or pain we ourselves gain by it.

¹ "Emotions and the Will," pp. 436 *sq.* (3rd edition). Cf. "Mental Science," pp. 357-360.

On the other hand, we may reply that :

(1) Desire is normally directed towards objects, not towards pleasure. This is shown with special clearness by the existence of disinterested benevolent impulses, but it is not peculiar to these. We do not desire things because we find them pleasant, but we find them pleasant because we desire them. Some desires we have before we have had the experience of the pleasure their gratification will produce. The child does not cry for the moon because of any remembered or imagined pleasure derived from its possession. It desires food long before we can suppose it to have any image of the pleasurable organic sensations of satisfied hunger.

(2) We do not, as a matter of fact, desire objects in proportion to the amount of pleasure they give us, nor even in proportion to the amount of pleasure we expect they will give us. (i) Where desire is strongest (*e.g.* in excessive craving for alcohol and drugs), the degree of pleasure is often very small. The desire becomes, as Dr. Ward says, "more imperious, though less productive of pleasure, as time goes on." (ii) There are some pleasures which can only be obtained by stimulating the growth of a desire. A boy does not collect stamps because stamps in themselves give him pleasure ; but having begun to make a collection from imitation, or because an album has been given him, he finds more and more interest in the pursuit. A five-pound note spent in many other ways would give more pleasure than spent in the acquisition of a stamp.

The stamp derives its whole value from its relation to his desire to complete a certain portion of his collection. All the pleasures of pursuit belong to this type, such as hunting, record-breaking in various games, etc. (iii.) There are many objects which we know to be capable of giving us pleasure, and to be easily attainable, which at the same time we do not desire. According to the doctrine of Dr. Bain, we ought to desire these directly we recognize their hedonic character.

(3) It is true that we may come to aim at pleasure for its own sake, and at objects only because they give us pleasure. (i) But this is not the normal and natural attitude of the mind. In fact, it is the special teaching of Hedonism, the ethical doctrine accepted by Dr. Bain, that pleasure *ought* to be followed. If desire is always directed towards pleasure, why spend effort in demonstrating that it *ought* always to be so directed? The very existence of Hedonism as an ethical doctrine is an admission that men constantly aim at other ends than pleasure, or at such objects as are not means to pleasure. (ii) The fact is that persistent pursuit of pleasure is not the mark of rationality, but of a morbid selfishness which defeats its own purpose. The man whose eye is always directed to the pleasure which he wishes to gain, instead of to external objects, is in a unhealthy mental condition and will certainly fail of his quest. This fact is called by Dr. Sidgwick the "hedonistic paradox."¹

¹ See Ryland, "Ethics," pp. 28-33, 150-153.

(4) Dr. Bain's view represents sympathy as essentially irrational. It is praiseworthy, but it is not sane. The emotional excitement caused by the idea of self-sacrifice and patriotism leads men away from the path which intelligence, as well as nature, marks out for them. This view is so obviously at variance with the facts revealed by introspection, and with the teaching of Ethics, that there is no need to dwell on it further than to point out that (*a*) it has never been proved that the only rational end of action is pleasure, and that (*b*) observation of children and the lower animals shows that sympathy develops, not as a morbid product, but in proportion to the general health and intelligence of the individual.

We must remember that it is true that what is desired is represented *sub specie boni*. "The realization of the object or end necessarily assumes a pleasurable aspect," as Sully says, with some exaggeration. The martyr ardently desires martyrdom, in spite of his terrors, because he has certain impulses which he knows it will gratify. But he does not desire it as a pleasure, or because it seems a pleasure.

§ 6. Control of Thoughts and Feelings.

We cannot alter the objective order which settles that a stimulus A shall be followed by a stimulus B and thus determines the order of our percepts, nor supersede the laws of Association which determine the order of our thoughts, by bringing certain images before our

minds because others have been there, nor can we abolish the attraction which certain ideas exercise over us in preference to others. But we can (1) stimulate the concentration and fixation of attention on a group of ideas by dwelling on the importance of them to the intellectual or practical ends we have in view, and (2) withdraw our attention from all rival ideas which, whether suggested by the central group or not, have no logical importance in reference to it.

This second, or inhibitory, process seems the more important. Voluntary attention is mainly a matter of voluntary inattention. All control of thought means, directly or indirectly, our refraining from attending to some presentations because certain others have an artificial interest for us. And thus power of will, to repeat an old witticism, is, in fact, power of "won't."

Control of intellectual processes is distinguished by a sensation of effort, which introspection seems to show is of the same nature as the feeling of muscular tension or strain. And it is often held by psychologists that, as Bain says, "the control of feeling and thought is through the muscles." The only fact over which we have direct control is the contraction of the so-called voluntary muscles. Hence it is argued that all mental control is indirectly derived from muscular control.

In the case of perception this is obviously probable. All perception involves control of muscles of the special senses, of the head, limbs, etc. From the control of these muscles comes control of images as well as of percepts, for images involve some

neural activity in the organs of the special senses, the muscles, etc. And we have seen how a representative element (imperfect visual image, verbal image, or some other symbol) lies at the base of every concept.

This imperfect image must, like the fully developed visualized image, involve an activity of the same muscles as would be involved in the corresponding percept from which it is derived.

While the doctrine has some likelihood, we must not take it as proved that intellectual and emotional control mean at bottom simply muscular control.

Control of emotions and impulses is possible on account of:—

(1) Our control of expressive movements, which are not only the external signs of emotion but are a part of its bodily conditions. Negatively, we can suppress those movements which at once express and help to develop the feeling; and positively, we can initiate those movements which are incompatible with the feeling and express its opposite. By putting on a serious face we go far towards suppressing hilarity; by making a muscular effort we get rid to some extent of the feeling of despair or of sloth.

(2) Our control of the ideas which arouse feeling. Negatively, we can keep out of the focus of attention ideas which stimulate (let us say) anger towards a person; and positively, we can keep within the focus ideas which tend to arouse gentler feelings towards the same person. It is important to set up the anti-

thetical ideas and modes of expression, but perhaps more important still to divert attention.

Control of desire or impulse follows from control of ideas and of feelings. We keep out of mind the image of that which we desire, say A, and the motor images of the acts necessary to attain it; we keep before attention images of objects (B, C, D,) which we also desire, but whose attainment is incompatible with that of A; or we occupy ourselves with some other train of presentations having no direct relation with A, *e.g.*, reading a novel, doing our daily work, etc. The surplus activity is in this way worked off.

§ 7. Habit.

Habit is at once a psychological and a physiological fact. A tissue or an organ acquires an organic habit, without the intervention of consciousness. It acquires the power of reacting in some special way to certain classes of stimulus. Habit is thus, on the physiological side, a sort of organic memory.

On the psychological side, habitual actions present certain special features. (1) They are more uniform than other actions; when an action has become habitual, it is done always in approximately the same way. (2) They are performed with greater ease than other actions of a similar complication which are not habitual, or than the same actions before they became habitual. (3) They are executed with a minimum of attention; they are performed without any distinct

motor representations ; indeed, when consciousness intrudes, it actually disarranges and hinders the action.

(4) There remains a tendency to perform them, which causes uneasiness when it is thwarted.

A habit is strong in proportion as these features are present, particularly the second and third.

The strength of a habit depends on (1) the amount of attention originally given to the action ; (2) the frequency of its repetition ; (3) the uniformity of its repetition ; (4) the plastic character of the mind. As we have seen, the mind has more " adhesiveness " in early life than in later ; and the same thing is true of the body. A man who has not learnt to walk gracefully, or to pronounce his words properly, in youth, seldom acquires the habits in later life.

Hartley called habit " secondary automatic action. It is voluntary and fully conscious action, which has become degraded almost to the level of reflex action. Dr. Ward holds that *all* automatic action was once conscious and purposive ; and that " either in the experience of the individual or of his ancestors volition, or something analogous to it, preceded habit."¹

Habit is of enormous importance on account of the economy of time, attention, and effort, which it effects. Just as fresh intellectual acquisitions are only rendered possible by obliviscence, so fresh practical abilities are only rendered possible by habit. If the musician had to give as much time and attention to every movement

¹ Article " Psychology," p. 43.

as the learner in his earliest stage of education, Padrewski would be impossible. In fact, without habit, the most ordinary actions of the day would occupy the whole of our time and available energy. Washing, dressing, eating, walking, would come, at the end of life, with as perplexing novelty to our limbs and minds as at the beginning.

Primarily, the term habit is applied to outward actions, but it is also applied to modes of thinking, feeling, and desire. Regular recurrence of any special line of thought or feeling, on the recurrence of any given presentation, leads to the formation of a cognitive or affective habit.

It is sometimes said that repetition strengthens habits of action, but dulls feeling. It is clear that this is not exactly true; feelings of pity, affection, and their opposites are strengthened by indulgence. The sentimentalist and the tyrant are made by practice. Regular recurrence of the same presentation does not dull feeling if the same amount of attention, as at first, is always given to the presentation. The musician does not get less pleasure from hearing a fine work for the sixth time. The surgeon would feel just as much for his patient, if he allowed himself to dwell on the man's sufferings as when he was first a student. Nor is it true, as Schopenhauer and the Pessimists allege, that pleasurable and painful emotions are differently affected by frequent recurrence of the same stimulus, and that while pleasure diminishes, pain does not. It is, no doubt, a fact that we get less pleasure from (say)

a beautiful picture, the hundredth time we see it ; but this is merely because it no longer arrests our attention. If we chose to attend, the pleasure is not diminished, and may be greater than ever. And it is, no doubt, a fact that some painful presentations, *e.g.*, organic sensations of a painful character, lose nothing of their painfulness by repetition, but this is because they always arrest attention. Other pain-giving percepts cease to give us pain, in the same way as the picture ceases to give us pleasure, because they fail to arrest attention. The surgeon, as we have said, is no longer overwhelmed by the sight of sufferings, because he has other things to think about. And we see that there are some pleasurable sensations of an organic or almost organic type, which, in the same way, always detain attention, however frequently repeated.

§ 8. Instinct.

Instinct means untaught ability. Certain intellectual and emotional abilities are in the broad sense instinctive ; but the name is more especially reserved for the inherited capacity to perform certain bodily movements, without individual experience or instruction.

Such movements are more complicated than those to which the name sensori-reflex is applied. A combination of impressions leads to a combination (often **an** elaborate sequence) of movements. Thus instinct has been called compound reflex action. "Instinct,"

says Romanes, "is reflex action into which there is imported the element of consciousness. The term is therefore a generic one, comprising all those faculties of mind which are concerned in conscious and adaptive action, antecedent to individual experience, without necessary knowledge of the relation between means employed and ends attained, but similarly performed under similar and frequently recurring circumstances by all the individuals of the same species."

In the case of a perfect instinct there would be absolutely no failures from the very first; no need of intelligence, or of trial and exercise, would occur. As a matter of fact, nearly all instinctive actions require some amount of practice before being performed with absolute precision. There is some amount of intelligent control to begin with.¹ Besides individual exercise, imitation and tradition (especially in gregarious animals) seem to bear a part in developing instinctive actions.

The actions and the promptings, whatever they may be (whether organic sensations, or external percepts), become bound up together, as we may safely assume, through some form of natural selection, in many cases probably with the assistance of heredity. The chief theories as to the origin of instincts are:—

(1) That they are degraded habits, which were once *purposive* and have become purely automatic. They may thus be described as cases of lapsed intelligence, handed on by heredity. This is Lamarck's theory.

¹ Lloyd Morgan, "Comparative Psychology," chap. xii.

(2) That they are the results of compound *reflex* actions which have become habitual in many individuals of a species : physiological changes have resulted, that is, certain nervous tracts have been more permeable than others, and these modifications acquired by individuals have been transferred to the offspring. This is the doctrine of Spencer, who calls instinct "organized memory."

(3) That they are the results of purposeless habits which chanced to be profitable, and have thus been perpetuated by natural selection, which has favoured individuals who chanced to display them. They are not due to inherited experience, and consciousness has had nothing to do with their origin. This is Darwin's and Weismann's doctrine.

§ 9. Higher Development of the Will.

When we can perform single actions by merely thinking of them and desiring them, and when we have achieved some degree of control over our thoughts, feelings, and impulses, further development is possible. We can plan a connected series of actions for some comparatively distant end or ends. We can refrain from action until time has been given for us to imagine the circumstances, to compare ends with ends, and means with means, and inquire which means are most likely to effect the end we seek, at least cost to ourselves. This is *deliberation*, the essential feature of

which is the inhibition of the impulse to act, so that the intellect may have time to do its work.

Deliberation may end in mere intellectual processes ; but if desire be strong, and the power of attention considerable, it leads to *choice* or *decision*. We determine to act in a certain way. Where this choice or determination cannot be instantly carried into effect, and its execution has to be postponed—still, however, with the full desire to perform it and belief that we shall perform it—we have *resolution*. This involves not only the power of choice, but the power of adherence to our choice—the habits of feeling and of active control which we call firmness, constancy, and patience.

Nothing is more common than deficiency of resolution. But defect of choice is, though more concealed, yet of frequent occurrence. In its extreme form it is a mark of some types of mental disease.

When the more general ends of action have been compared, a few stand out as more obviously important than others. Language, law, religion, social habits, mark out certain ends as of special worth, *e.g.*, wealth, dignity, comfort, usefulness to others, and so on. Few people attempt an absolute unification. They are content with an ill-defined oligarchy of ends. When action has been systematized and habits formed which render possible the attainment of these ends, or some of them, we have *conduct*. Conduct is relatively consistent, but to few, if any, is it given to have so simple a scheme of life and such entire control of impulse and action as to aim only at one end.

Character is the counterpart of conduct. It is the tendency to certain lines of systematic action; it may be looked on as a sum of habits of thought and action fully or partially formed. Like conduct, it is relatively permanent, but it is actually subject to constant, and as a rule very gradual, change.

APPENDIX A.

BOOKS RECOMMENDED.

I. GENERAL.

- Höfding: *Outlines of Psychology*.
James: *Principles of Psychology*. 2 vols.
Sully: *The Human Mind*. 2 vols.
Ward: Article *Psychology*, in the *Encyclopædia Britannica*.

II. FOR FURTHER GENERAL READING.

- Bain: *The Senses and the Intellect*.
„ *Emotions and the Will*.
Külpe: *Outlines of Psychology* (transl.).
Ladd: *Psychology Descriptive and Explanatory*.
Lotze: *Outlines of Psychology* (transl.).
„ *Metaphysics*, book iii. (transl.).
„ *Mikrokosmos* (transl.).
Spencer: *Principles of Psychology*.
Stout: *Analytic Psychology*.
„ *Manual of Psychology*.
Titchener: *Outlines of Psychology*.
Wundt: *Outlines of Psychology* (transl.).
„ *Lectures on Human and Animal Psychology*
(transl.)
Mind, 1876, sq.
L'Année Psychologique, 1895, sq.

III. SPECIAL.

There are an enormous number of recent volumes dealing with special psychological questions or points of view. The following selection suggests some of those most likely to be of service to the student who has only read the general books mentioned above.

(1) PHYSIOLOGICAL PSYCHOLOGY, ETC.

Ladd: *Elements of Physiological Psychology.*

Wundt: *Physiologische Psychologie* (French transl.).

Helmholtz: *On the Sensations of Tone* (transl.).

Ziehen: *Introduction to Physiological Psychology* (transl.).

Sanford: *Course of Experimental Psychology.*

Lewes: *Physical Basis of Life.*

(2) COMPARATIVE PSYCHOLOGY, ETC.

Lloyd Morgan: *Comparative Psychology.*

Romanes: *Animal Intelligence.*

„ *Mental Evolution in Man.*

„ *Mental Evolution in Animals.*

Preyer: *Mind of the Child* (transl.).

(3) ABNORMAL PSYCHOLOGY.

Binet and Féré: *Animal Magnetism* (transl.).

Binet: *Alterations of Personality* (transl.).

Pierre Janet: *L'Automatisme Psychologique.*

Ribot: *Diseases of Memory* (transl.).

„ *Diseases of Will* (transl.).

„ *Maladies de la Personnalité.*

(4) THE SENSES, PERCEPTION, ETC.

Sully : *Sensation and Intuition.*

„ *Illusions.*

(5) EMOTIONS AND WILL.

Darwin : *Expression of the Emotions.*

Lloyd Morgan : *Habit and Instinct.*

Nahlowksi : *Das Gefühlsleben.*

(6) VARIOUS.

Ribot : *Psychology of Attention* (transl.).

Galton : *Inquiry into Human Faculty.*

Lewes : *Study of Psychology.*

IV. MAINLY OF HISTORICAL INTEREST.

Aristotle : Περὶ Ψυχῆς (edited by E. Wallace as “ Aristotle’s Psychology ”).

Locke : *Essay concerning Human Understanding.*

Berkeley : *New Theory of Vision.*

Leibnitz : *Nouveaux Essais.*

Hume : *Treatise of Human Nature.*

Hartley : *Observations on Man.*

Reid : *Essays on the Intellectual and Active Powers.*

Hamilton : *Lectures on Metaphysics.*

„ *Notes to Reid.*

James Mill : *Analysis of the Human Mind.*

J. S. Mill : *Examination of Hamilton’s Philosophy.*

APPENDIX B.

QUESTIONS FROM LONDON B.A. EXAMINATION PAPERS.

1. Show the relation in which the subjective methods of psychological study stand to the objective methods of research, bringing out the advantages and disadvantages of both. (B.A., 1894.)
2. What do you understand by a psychological or psychophysical experiment? Show in what ways such experiments may contribute to a more exact knowledge of mental phenomena. (B.A., 1893.)
3. What do you understand by psychological analysis? What are its main difficulties, and to what extent can they be overcome? (B.A., 1892.)
4. What evidence is there in support of unconscious cerebration? Compare the doctrine of unconscious cerebration with that of latent or subconscious modifications of mind. (B.A., 1891.)
5. How would you respectively define a conscious, and an unconscious, mental state? Illustrate the connection between the two. (B.A., 1895.)
6. Explain what is meant by a Mental Faculty. What are the advantages and disadvantages of treating the mind as a bundle of faculties? (B.A., 1894.)

7. What gave rise to the doctrine of "Faculties" of mind? How far is it warrantable and how far deceptive? (B.A., 1891.)
8. Define a mental faculty as ordinarily understood. Do you consider the psychological doctrine of separate faculties correct? In what relation do they stand to the personality of the individual? Do they all sustain the same relation? (B.A., 1890.)
9. Critically estimate the value of the classification of mental states as those of Cognition, Feeling, and Volition. (B.A., 1896.)
10. Define Attention; describe the various degrees of it; and consider how far it involves muscular elements. (B.A., 1893.)
11. What is "preparing the attention"? What effect has it upon the apprehension of the object to which attention is directed? Analyze the state of mind of one whose attention is "prepared." (B.A., 1896.)
12. Upon what evidence is the doctrine of the Relativity of sensations founded, and with what justification? (B.A., 1896.)
13. State and comment on the principles that have been applied in classifying sensations, giving, with reasons, the classification you prefer. (B.A., 1890.)
14. What different constituent elements would you distinguish in a Sense? Select any one of the senses by way of illustration. (B.A., 1891.)
15. What are the most important psychological differences observable among the several senses? Show how these affect the quantity and the importance of the knowledge which they respectively give us. (B.A., 1895.)

16. What are the Organic Sensations? Explain their general characteristics in contrast with the special sensations, and discuss their importance. (B.A., 1896.)
17. Give a brief account of the sensations of taste, and inquire (1) how far they are distinguishable from other sensations, and (2) how far they are capable of being classified. (B.A., 1892.)
18. Give a brief psychological account of visual sensations. Are there any grounds for distinguishing between sensations of light and sensations of Colour? Are there any other senses, besides sight, which furnish negative after-sensations? (B.A., 1893.)
19. Give a brief summary of Berkeley's theory of vision and discuss the main objections brought against it. (B.A., 1890.)
20. In what sense, if any, do we *see* the size of an object? Show fully the process by which we learn to recognize the size of an object from its visual appearance. (B.A., 1895.)
21. Explain the terms *Sensation* and *Perception*, and state your view as to the relation between the processes so named. (B.A., 1890.)
22. Explain how visual, auditory, and tactual sensations combine in the perception of objects, and show their mutual relations. (B.A., 1894.)
23. Define Perception, explaining the relation of perception (*a*) to sensation, (*b*) to representation, and (*c*) to inference.
Can any useful distinction be made between Perception and Percepts? (B.A., 1893.)
24. Give a brief comparative account of the movements

accompanying the use of the several sense-organs, and inquire into the connection between these movements and the development of the knowledge of space. (B.A., 1894.)

25. Describe the auditory space-perceptions of an ordinary human being. Compare with these the probable auditory space-perceptions, (1) of a man born blind, and (2) of a mammal, such as a horse, with movable external ears. (B.A., 1893.)
26. What are local signs, and how are they concerned in the perception of the position of an object? (B.A., 1896.)
27. The perception of an external object is described by some thinkers as an immediate cognition, by others as a process of constructive reasoning. Compare these views, and inquire how far they are compatible. (B.A., 1891.)
28. What have been called illusions of Perception? Select any one of them, and explain it in detail. (B.A., 1890.)
29. Examine from a psychological, and from a philosophical point of view, the doctrine that material objects have a real and independent existence. (B.A., 1894.)
30. Analyze the elements involved in perception, and show from your answer what the conditions of good observation are, and the various ways in which illusion may arise. (B.A., 1896.)
31. Does Psychology cast any light on the metaphysical controversies (1) between Monism and Dualism, and (2) between Realism and Idealism? (B.A., 1895.)

32. Discuss the nature of the powers that have been included under the general term "memory," and distinguish their functions accurately. (B.A., 1889.)
33. Explain fully the mental process by which we discover the authorship of an unfamiliar quotation, pointing out the laws of association or suggestion involved. (B.A., 1892.)
34. How far does the process of remembering an event admit of analysis? Discuss what is involved in trying to remember something forgotten, and account for the fact that in old age things learnt last are forgotten soonest. (B.A., 1896.)
35. Illustrate the process of the Association of Ideas, beginning with its most elementary forms. (B.A., 1891.)
36. What is meant by the Association of Ideas, and what is known of its physiological accompaniments? Is all association reducible to one form? (B.A., 1894.)
37. Explain what precisely you understand by the terms Association and Idea, when the association of ideas is spoken of. Is it desirable to distinguish between forms of association and laws of association? (B.A., 1893.)
38. What does the association of ideas presuppose? Trace the working of association and its results in a single selected instance. How far is it a formative process? (B.A., 1889.)
39. Is the Imagination ever useful in a strictly analytic process? Show how it may hinder scientific procedure. (B.A., 1889.)
40. Analyze the processes by which Memory and Imagina-

tion respectively work, when one sees for the first time a great historical picture. (B.A., 1895.)

41. What is imagination? Explain in detail, using illustrations, the steps which the mind goes through when by imagination it forecasts scientific truth. (B.A., 1896.)
42. What circumstances enable us to estimate the duration of events in our experience? (B.A., 1890.)
43. Make a psychological analysis of the perception of Time; enumerate the several data or factors concerned; and show how we advance from these subjective experiences to the objective conception of time. (B.A., 1893.)
44. Compare the perception of space with that of time, and show how they are related, both psychologically and logically. (B.A., 1892.)
45. Criticize, from the psychological point of view, the answers that have been offered to the question: What is the object in mind when a general term is used? (B.A., 1890.)
46. Distinguish between the psychological and the logical aspect of the question raised by Nominalism, and state briefly how you would answer the former. (B.A., 1893.)
47. The origin of concepts. Give a brief account of the chief theories of modern philosophers on this question. (B.A., 1890.)
48. Examine from a psychological point of view the ground of the Nominalist's contention that generality is confined to the name. (B.A., 1895.)
49. Distinguish between the psychological and the logical treatment of thought, with special reference to the

question whether all our thinking is carried out by concepts, as the logician understands them. (B.A., 1891.)

50. "No reason without language,"

"No language without reason."

Comment critically on these aphorisms. (B.A., 1890.)

51. Explain fully the process by which a child (*a*) learns the meaning of the words of his mother tongue, (*b*) reduces a verbal description to a series of mental pictures. Are the two processes in any way connected? (B.A., 1894.)

52. By what lines of investigation is the psychological connection of language with thought most precisely ascertained? (B.A., 1892.)

53. Give a psychological analysis of the process of judgment, and consider how far it throws light on the characteristics of judgment recognized in logical theory. (B.A., 1889.)

54. Analyze in relation to one another the processes of perceiving and thinking. (B.A., 1889.)

55. Take an ordinary train of thought, and bring out fully the part played by pictorial images, by association, and by the activity of thought properly so called. (B.A., 1895.)

56. Examine the process of judgment, contrasting it with perception, and show that it involves both analysis and synthesis. (B.A., 1896.)

57. What is the proper place of the conception of the Ego or subject in psychology? Distinguish between the psychological and the metaphysical conception of the Ego. (B.A., 1894.)

58. What do you understand by a simple feeling? Can the feelings be classified according to the degree of their complexity? (B.A., 1891.)
59. Classify, and appraise, the theories which have been advanced as to the nature of pleasure and pain. Is it possible to bring them all under one principle? (B.A., 1895.)
60. Discuss the question whether pleasure and pain are equally positive and fundamental modes of feeling. (B.A., 1892.)
61. Analyze the emotion of Fear or Anger with a view to determine the relation between an emotion and its bodily accompaniments. (B.A., 1894.)
62. Explain the effect of Habit and Novelty respectively on the feelings. How far are they antagonistic? (B.A., 1896.)
63. Give a careful psychological analysis of belief in testimony. (B.A., 1890.)
64. Discuss the proper place of Belief in a systematic account of mental phenomena. (B.A., 1891.)
65. Point out some of the ambiguities of the term Belief, as employed in Philosophy and in Psychology. Is belief distinct from knowledge, or merely one aspect of knowledge? (B.A., 1893.)
66. Distinguish the psychological from the logical aspect of Belief. What psychological explanation can be given of the origin of ghost-stories? (B.A., 1895.)
67. Define a voluntary act. Take what you regard as its most rudimentary form, and compare it with the later phenomena of volition. (B.A., 1891.)
68. Analyze and compare the mental processes involved in willing to move one's arm, in resolving to resist

- temptation ; showing the part played by Attention in each case. (B.A., 1894.)
69. Distinguish purposeless movements from voluntary ones, and explain how the latter originate. (B.A., 1895.)
70. Compare any two recent theories of the origin of voluntary movement. (B.A., 1892.)
71. To what extent, and in what ways, is control of Emotion possible? (B.A., 1890.)
72. Is Desire always directed to the attainment of pleasure? Point out the ethical bearing of the question. (B.A., 1892.)
73. What is voluntary self-control, and how is the self-control exercised by the developed character acquired? Describe in detail the process of controlling an undesirable thought. (B.A., 1896.)

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